

JAMAICA

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR

THE YEAR ENDED 31ST DECEMBER, 1931.

Ordered by His Excellency the Governor to be Printed.



JAMAICA
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1932.



KING'S HOUSE, JAMAICA.
THE LAWNS.



CASTLETON GARDENS.



DEPARTMENT OF SCIENCE AND AGRICULTURE.

Report for the year ended 31st December, 1931.

I.—GENERAL OBSERVATIONS.

The year 1931 was remarkable for its liberal and well-distributed rainfall whereby crops of all sorts flourished and large yields were obtained from every kind of cultivated crop all over the Island.

The rainfall for Jamaica was 91.5 inches or 15 inches above the average of the previous 50 years. On the northside the increased rainfall was much higher in proportion than on the southside, but even on dry areas such as the Liguanea Plain of St. Andrew, a well-distributed rainfall was experienced that proved most favourable for every sort of crop and cultivation. Although threatened repeatedly with hurricanes in the season of tropical storms, Jamaica fortunately escaped serious losses by wind and the agricultural record for the year was indeed a fortunate one.

This advantage, however, was offset by the rapid shrinkage of world markets and the failure of credits followed by the collapse of Sterling as a medium of exchange. Practically every article of tropical produce had been encouraged to greater output by the good prices ruling for the past 15 years. Suddenly the world demand for these products shrank away and producers found themselves faced with enormous stocks of produce which were unable to find a market, even at ruinous prices.

It is really due to the Banana Industry that Jamaica has not experienced an even more drastic depression in trade than has been the case in 1931. Historians of the Colony in future days will doubtless indicate that during the world trade crisis, Jamaica was saved through the miracle of a Co-operative Fruit Association that had actually emerged as a live and successful business effort, whereby the Colony was enabled to entrench its premier industry and to hold its head above the floods of the world-wide trade crisis. The interpretation of this state of the Colony's export trade in terms of money is roughly as follows:—For the first three-quarters of the year for which the records are alone available to date, our products fetched less by three-quarters of a million pounds sterling than they had brought in the former year. Thus the producers of Jamaica were down a little over a million pounds on the value of their exports as compared with the previous year. In a small community so great a drop in values was bound to affect the general prosperity of the people and it has to be admitted that a good deal of hardship and lack of money has been experienced by planters of all grades.

Bananas.—The exports for 1931 amounted to 22,287,242 stems as against 24,585,505 for the previous year or a reduction of 2,298,263 stems. Prices in North America, particularly in the United States, were very unsatisfactory and, at times, bananas were practically given away by the various Fruit Companies owing to the lack of demand. On the other hand, England and Rotterdam afforded reasonably good markets so as to enable the standard price of 2/- per count bunch to be more than realized by the Co-operative Association. The new fruit ship of the Association proved itself a fast and economical transporter of bananas to England and to Europe and it is due to the success of this vessel that the "Producers" have been able to satisfy their clients as to the minimum price to be paid for bananas before profits are shared.

The large Companies sought to reduce costs by the drastic cutting down of staff and expenses. Planters of all grades have also been forced to the same position. Generally speaking, these retrenchments, particularly in cultivation, have been unsuccessful. The experience of 1931 shows that in Jamaica the good cultivation that had been evolved by our banana planters during the past forty years was sound and that the substitution of the cutlass for the fork and the hoe and the leaving of bananas unpruned and uncultivated was detrimental both to the yield and quality of the fruit.

It is hoped that a recovery of confidence in the future of the Banana Industry will encourage our planters of all grades to improve on recent standards of economical management so that we may produce fruit of the best quality.

The battle with Panama Disease has been faithfully carried on by our staff of Inspectors. The results are seen in the statistical returns which show the following records. In the three years previous to 1929 the rate of increase remained steadily at 57 per cent. per annum. In that year, however, the rate of increase rose to the alarming figure of 115 per cent. This was mainly due to the widespread acceptance of the "one-root" treatment recommended by a visiting scientist from the Imperial College, Trinidad, which has been found to lead to a disastrous and catastrophic spread of Panama Disease wherever it has been adopted in Jamaica. In 1930, the rate of increase of disease was reduced to 100 per cent. and in 1931 to 31 per cent. This favourable result has been achieved by strictly enforcing the Law and the faithful work of the staff of Inspectors.

If the "one-root" system had been permitted in 1929 the diseased plants recorded for 1931 would have been over one million in number and the reduction of our premier industry to a low standard would have been imminent. For 1932 we estimate to have to deal with 130,000 diseased plants at a cost of £15,333 which is only 6 per cent. more than was expended when the amount of disease was only one-eighth of that to be treated this year. Looking at the matter as a form of insurance for our major industry, the cost of treating Panama Disease will amount in the coming year to an insurance premium of only $\frac{3}{4}$ of one per cent.

As I shall shortly be handing over the direction of the Department to other hands, I would most earnestly appeal to the people of Jamaica, as being a first essential for our stability and prosperity as a tropical Colony, to afford the fullest support to the stern rearguard action which is now imposed upon Jamaica in order to preserve its Banana Industry until the day when a "new banana" immune to Panama Disease and suitable for the trade has emerged. I would also appeal most earnestly to all our leaders in Jamaica to avoid at all hazards the making of Panama Disease a political question. A great economic advantage in the cost of treating the disease has resulted from the experiments recently carried out by the Microbiologist whereby it has been found that certain grades of fuel oil are most effective for killing banana plants *in situ* without the cost of digging out and burning the plant material. It is estimated that a reduction of about 50 per cent. in the cost of treating a case of Panama Disease has thus been effected.

The banana breeding work continues to progress and after considering the results of the first ten years of 'long range research' at the Trinidad College which disclose a nil return in the production of a cultivable banana as a result of a decade of intensive research by the most eminent scientists in the West Indies, Jamaica should feel so encouraged at its own results in this line of effort as to warrant some optimism in forecasting a favourable outcome for the efforts of its own Department.

A large number of quite good seedling bananas, immune to Panama Disease, have been produced. Each time the plants ratoon the fingers get longer and the bunches larger. Several bunches of our seedling bananas were, in fact, sold and accepted by the Trade as Jamaica Bananas in 1931, showing that we have already approximated to the desired standard. The next crop of seedlings of the second generation is awaited with great interest and among these may be a fruit suitable for the new conditions. One possibility that is already apparent from the breeding of new bananas in Jamaica is that of producing bananas of superior flavour and quality that could be sold as Dessert Fruit in foreign markets at a premium over the ordinary bananas of commerce. Some of the immune seedlings possess a most attractive sub-acid or "apple" flavour and are lighter and more digestible than the Banana of commerce as edible fruit. The appointment of a Geneticist to assist in the work of banana breeding in Jamaica should be of great assistance in guiding our future efforts into the most profitable channels.

Thanks are due to the Imperial Government for a free grant from the Colonial Development Fund which has provided the necessary funds for equipping the new Laboratories of the Agricultural Chemist and the Geneticist.

Sugar.—The remarkably continuous rainfall of 1931 resulted in the production of a heavy tonnage of canes in the field, but these, in many cases, failed to ripen and there was a considerable lowering in the sucrose content of the juice. Thus many factories were forced to grind a good deal more cane than usual in order to produce a ton of sugar. The general result of these conditions was a reduction in the export of sugar from 70,200 tons in 1930 to 64,560 tons in 1931.

The rum market was also in difficulties, some estates finding themselves with a three years' crop of rum still unsold. The rum exported in 1931 amounted to 4,083 puncheons as against 6,500 puncheons in the previous year. These conditions, however, have been met in a heroic manner by the passing of the "Rum Restriction Law," whereby an equality of sacrifice in the production of rum for the coming crop has been imposed on all estates by legal compulsion. It is thus hoped that the trend of trade will enable the unsold rum from previous crops to be assimilated in the markets of the world, while a reasonable and fair allocation of the useful but limited local market for rum has been provided for all the producers alike.

Despite the grave difficulties which all sugar producers in the world are now facing, the Jamaica sugar planters have put up a splendid fight. Cultivation has not been neglected but has, in fact, been improved. New canes giving larger yields have replaced the old varieties and in 1932 the largest crop of sugar produced in Jamaica during the past 50 years is confidently expected.

The Barbados cane "BH 10 (12)" is now established as the standard cane for average conditions in Jamaica. This cane possesses many excellent qualities and is without doubt the best West Indian cane introduced into Jamaica during the past forty years. On inferior lands in Vere a cane of similar parentage known as "S.C. 12/4" is giving wonderful results both as plants and ratoons. The Hawaiian cane "E.K.28" has done well in some of the best soils of Vere but is not generally suitable for cultivation in Jamaica. The immune Java cane "P.O.J. 2725" is rapidly replacing "Uba." It gives a fine tonnage but suffers from

the disadvantage of early arrowing and requires special treatment in planting and reaping to give the best results. The "wonder cane" of Java, "P.O.J. 2878," has been widely distributed throughout all the sugar lands of the Colony and is now under estate trial. It shows great promise and is a cane of noble appearance but it is susceptible to wind storms and appears rather soft for hard conditions. There is reason to believe that in favourable areas in Jamaica it will produce large yields of sugar and become of commercial importance. The Department of Agriculture, Barbados, kindly sent us cuttings of two of their new seedlings which were considered likely to displace "B.H 10 (12)." These varieties "B.726" and "B.891" have been found so highly susceptible to Mosaic Disease that they are not likely to be useful in Jamaica where canes with a good resistance to Mosaic Disease are necessary.

Coconuts.—A good crop of nuts resulted from favourable seasons. The exports were nearly 35 million nuts or 4 million more than in the previous year. On the other hand the export of Copra fell from 300 tons to 180 tons (approximately). Owing to trade difficulties and the severe competition of whale oil, the foreign markets for Copra were gravely affected. The reflex action of this state of trade has resulted in the practical organization of the Coconut Co-operative Association, whereby the local markets for soap and edible oils should now be provided for by the produce of our own coconuts. The local soap made from pure coconut oil is a complete success. The factory finds a ready sale for its soap and is making a profit at a time when most manufacturers of soap are finding it difficult to cover their cost of production. The by-product in the form of coconut cake is proving very useful to dairymen and poultry keepers. At Hope we have substituted coconut cake for two-thirds of the oat ration for the working mules with advantage both in cost and in the condition of the animals. The Hope Farm has been using with success a mixture of half coconut cake and half imported decorticated cotton seed meal as a concentrate for feeding the working herd of dairy cows.

Logwood.—This product remains in a somewhat stagnant condition. The manufactured extract has remained at last year's very moderate standard. The demands for wood were slightly better and for the first three-quarters of the year, the values of logwood exported were recorded as £43,000 compared with £34,000 for 1930. It is to be hoped that some influence arising from the New Imperial Tariff may revive in England the manufacture of logwood dye from Colonial dyewood. At present the Imperial trade in logwood dye is hampered by foreign trusts and competition from the Continent of Europe. The local producers of logwood are afraid to take active steps to seek protection in the Imperial Market lest they should lose their present small outlet for logwood with a trust which has all the characteristics of a monopoly.

Coffee.—The high-grade Blue Mountain Coffee has kept its trade and maintained its high price. The ordinary and lower qualities of Jamaica Coffee have suffered through the gigantic over-production of Brazil which is reported to have coffee for the whole world for three years stored in one port alone. Coffee producers in Jamaica are now looking eagerly to the Mother Country to give them help in this difficult crisis and to foster the consumption of Empire-grown coffee in the United Kingdom. Whereas the coffee exported in 1930 was about 500 tons, that in 1931 was less than 400 tons in quantity. A good coffee crop is expected for the coming year.

Cocoa has been a drug in the market; the quantity exported was 2,660 tons as against 3,000 tons (approximately) in the previous year, while the financial returns have been very poor indeed, less than £17 per ton on the average. This ruinous state of the Cocoa market which has been chiefly brought about by excessive production in West Africa, is so unpromising that very little interest is now being taken in this staple in Jamaica. As the larger producers are reducing their acreage of cocoa while many small settlers leave their cocoa trees neglected, it is to be expected that the production of cocoa in Jamaica will soon dwindle to quite small dimensions.

Ginger.—The exports of ginger fell by 250 tons to 867 tons which were valued at an average price of 28/- per 100 lbs. At present, bananas offer a better prospect for the small growers than ginger and it is likely that the output of the latter will now be reduced. This reduction of crop should eventually lead to some improvement in the price, for Jamaica ginger is unrivalled for real ginger quality and flavour. Unfortunately the market is strictly limited and no drop in price has any appreciable effect on the consumption of this article.

Citrus Fruits.—Until the close of the year, the trade in citrus fruits was most disappointing. Markets were poor and the heavy autumnal rains rendered the fruit liable to rot in transit. Heavy losses were incurred by shippers particularly in the month of October from this cause. The Citrus Producers' Association obtained the services of the Microbiologist to investigate the matter and a large scale test of various methods of treatment was carried out at the Central Packing House. These researches proved that the gassing of the fruit with Ethylene gas increased the loss by 'Stem-rot' by 300 per cent. and confirmed the complaints of shippers that the compulsory gassing of their fruit was resulting in serious losses of fruit by rotting. By using small, repeated doses of gas and removing the button or attachment of the stalk after such treatment, citrus fruits were found to suffer very small losses from this cause in comparison with heavily gassed fruit in which the infected stalk was permitted to remain.

Recently, both in the English and Canadian markets there has been a strong revival of trade and by the preferences granted to our fruit by the Imperial and the Canadian Governments, Jamaica is now placed in a position to take up citrus production with some confidence.

The exports of grapefruit remained practically the same as last year, just under 100,000 boxes. The large distribution of grapefruit plants to small cultivators which has been made in the last few years by the Hope Nursery will enable a large quantity of this fruit to be produced by small settlers in a few years' time. A fine orchard of seedling grapefruit from the Hope Nursery has been established in Trelawny by an enterprising planter who has found the fruit in every way satisfactory both for export and local consumption. The owner states that he is not prepared to re-bud a single one of these seedling trees as they are all satisfactory.

It would now appear that a large market for Jamaica oranges is developing in Canada. There are many thousands of orange trees all over the Island that by a little care and cultivation could be resuscitated so as to provide a large increase in the present output of oranges. An active campaign in this direction is strongly commended to the Agricultural Society through their Instructors and Branch Societies, so that this fine opening in Canada can be more fully utilised by the people in Jamaica.

The exports of orange oil in 1931 amounted to 63,000 lbs., an increase of 16,000 lbs. over the previous year.

Honey remained steady at about the same standard as last year, viz., 132,550 gallons. Prices have fallen, as might be expected. This product will amply repay the formation of a Co-operative Association whereby the honey can be graded and marketed to the best advantage.

The honey produced in Jamaica varies greatly in colour and flavour. That produced from Logwood is of the highest quality and capable of holding its own with the fine honeys from New Zealand and elsewhere. A new Demonstration Apiary was established at the West End of the Island during the year by the Agricultural Society who received a special grant for the purpose.

Pimento.—The year was favourable for the production of pimento so that the exports stand at over 5,300 tons as compared with 4,200 tons for 1930. The price, however, fell to a very low standard and many producers found that there was a very small margin left over the cost of production. The trouble with pimento is that the world does not require as much as Jamaica produces in an average year and it is only in the years of scarcity that the price is satisfactory.

If the Island could reduce its output to one-half of the production of 1931, a far more satisfactory trade would result.

Pimento leaf-oil has been depressed and it is difficult for the producers to meet the present low standard of price.

Tobacco.—The Cigar trade has felt the effects of the general trade depression so that the exports are less than in 1930 both in quantity and value. The local cigarette trade has benefited from recent tariff changes but unfortunately this has not helped the local growers of tobacco as the cigarettes are mainly manufactured from imported leaf.

The native industry of "rope-tobacco" continues to flourish and this crop affords a useful outlet for the people in the dry areas of St. Elizabeth who find this a remunerative business.

Sisal Hemp.—The world markets for fibre have been so poor that it has not been possible in Jamaica to produce sisal fibre at the price obtainable abroad. Fortunately the local rope market, with some assistance from a scientific tariff, has enabled a fair proportion of the local fibre to be utilised at a profit. The native sisal rope is found to be excellent and has almost displaced the imported article in the smaller sizes which are generally used for roping donkeys and drays and on cattle pens.

Livestock.—Except for a few sporadic cases of Anthrax which were speedily suppressed by vaccination methods, the year has been free from any dangerous diseases of stock. In certain parts of the Island losses of cattle arise from the presence of "nightshade" (*Eurechites suberecta*) in the pastures. When this poisonous plant has been biled down in cleaning pastures it dries and is then frequently eaten by the stock. This weed should be regarded as a definite enemy and danger to livestock and should be completely exterminated in all pastures on a well-conducted pen. The price of cattle has dropped and owing to the fall in exports large sections of the people have given up eating fresh beef so that it is getting difficult to find a market for beef stock. Efforts have been made to seek an export market and the visit of Mr. R. E. Montgomery, M.R.C.V.S., Adviser on Animal Health to the Colonial Office, was helpful in directing the minds of the penkeepers in Jamaica to the possibility of selling fat cattle to Trinidad and possibly the Bahamas. There are difficulties in the way but if Trinidad would help this Colony as we have been doing in the case of her oil products, it should be practicable for the superior beef cattle of Jamaica to be sold to mutual benefit in the sister Colony. The dairy industry is growing steadily. During the past 20 years the 500 bulls distributed from the Government Stock Farm at Hope have played a great part in improving the cattle of the Colony and there are large numbers of cows all over the Island capable of commercial exploitation for dairy purposes if the requisite business organization were established. There is £150,000 a year being sent abroad at present to pay for condensed milk and butter which Jamaica is really capable of producing herself if the matter be approached in the right way as an Island-wide co-operative effort. The results of over 20 years' constructive work in the breeding and selection of tropical dairy cows at the Hope Farm will shortly be published. If the results therein recorded are effectively applied to this problem, Jamaica will be able to add £150,000 a year to the wealth of the Colony and also enrich the lives of the people with ample supplies of good milk rich in vitamins and conducive to the development of a stronger and more vigorous population in the future.

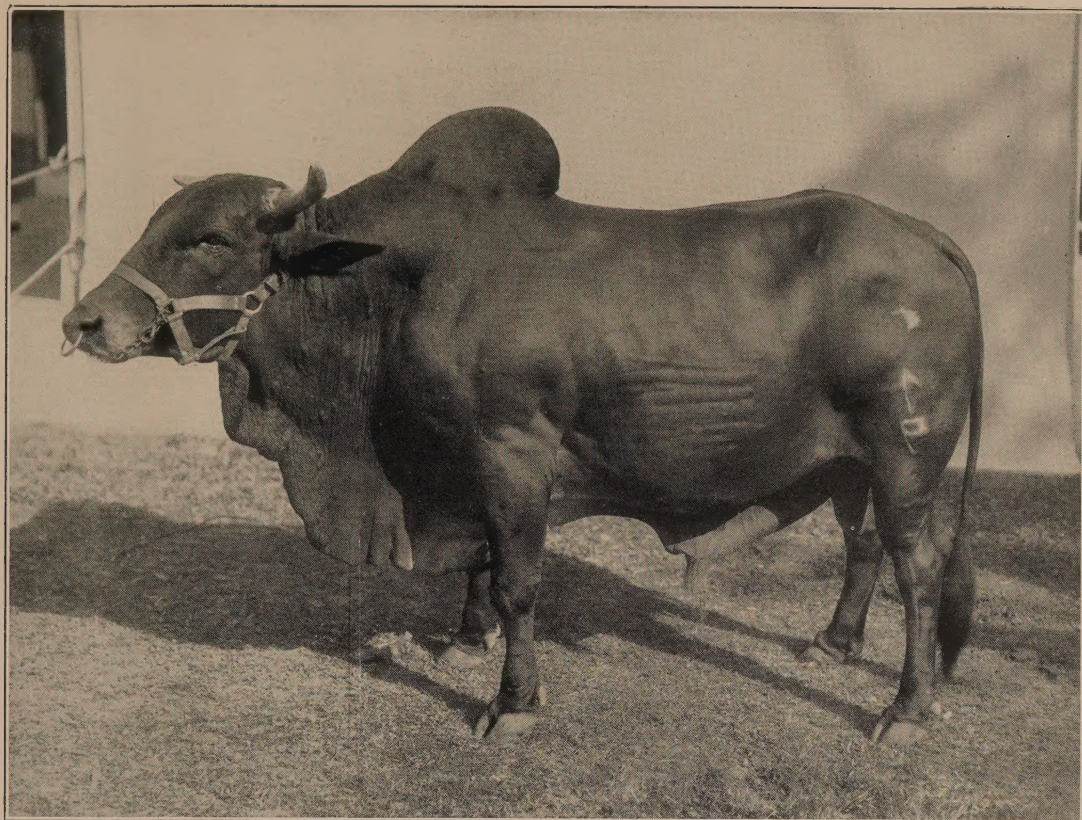
One of the illustrations included in this Annual Report is that of a remarkable Red Poll heifer named "Hope Beauty," of pure blood and representing the third generation in the tropics. This heifer weighed over 1,600 lbs. when her picture was taken, eclipsing in weight that of all cows of all the breeds tested at the Hope Farm, while she gave 21 quarts of milk with her first calf. This pedigree Jamaica cow is one-third larger in body and has given 70 per cent. more milk than her ancestress which was imported from the famous Sudbourne herd in England in 1911. I mention this record to show that Jamaica is capable of producing first class pedigree cattle if due attention be given to the fundamentals for success.

The influence of the "Sanhiwal" or Montgomery breed of Zebu cattle from India has been found to be truly remarkable. Composite animals containing $\frac{1}{4}$ to $\frac{1}{8}$ of this Indian blood have been found superior to all the pure-bred dairy cattle tested at Hope Farm. Hardy, productive cows suitable for outdoor life in the tropics have thus been produced at Hope which give excellent yields of rich milk.

In handing over the affairs of the Department to my successor, I have satisfaction in recording that as a result of 23 years of concentrated effort, the finances of the Government Stock Farm at Hope are in a satisfactory state, showing a gain of £15,832 19s. 2d. in assets and a net gain of £42,460 in the capital value of the Hope Estate which was purchased as a public property for £5,422 in 1914.

AGRICULTURAL EDUCATION.

The Government Farm School has been re-organised in accordance with the recommendation of the Special Committee as approved by the Legislative Council. The new Headmaster, Mr. J. W. Howe, M.Sc. B.S.A., from the University of Alberta in Canada, arrived in July and has been actively engaged in reorganising the curriculum and internal affairs of the Farm School. The new branch at "Grove Place" in Manchester has been given an excellent start under the management of Mr. A. F. Thelwell and I am pleased



INDIAN MONTGOMERY (SANHIWAL) BULL
"PUSA".



PURE BRED RED POLL HEIFER
"HOPE BEAUTY, J.135"
THIRD GENERATION IN JAMAICA.
WEIGHT 1,602 LBS. GAVE 21 QUARTS WITH FIRST CALF.

to report that the new venture is proving a practical success. The students are gaining valuable practical experience during their 6-week periods at "Grove Place," while the new Experiment Station and Plant Nursery will doubtless be helpful to the people in the vicinity. The old estate buildings at "Grove Place," were converted, at a very moderate cost, into commodious and airy quarters by the Public Works Department. The Colony now possesses in its Farm School an Institution admirably suited, equipped and staffed for training young men on sound and practical lines so as to promote the success of the agricultural industries which are suitable for local conditions in Jamaica. A course of lectures and demonstrations for the staff of Instructors of the Jamaica Agricultural Society was given at Hope in January last and the public were also invited to attend. This course could with advantage become an annual event, in order to promote a closer contact between the technical officers of the Department and the Instructors of the Agricultural Society.

HORTICULTURE.

Despite hard times, we have been enabled to maintain the Public Gardens in order. Many improvements are to be seen, particularly at Hope and Castleton Gardens, where visitors have been far more numerous than heretofore and have shown themselves appreciative of what has been provided for their enjoyment. The Orchid House and Aquarium at Hope has been thronged with visitors and great interest has been taken in the continuous display of flowering orchids as well as in the native and ornamental fresh-water fishes displayed in the Aquarium. The technique of raising orchid seedlings, which had hitherto been rather a trade secret, has been successfully solved by the co-operative efforts of the Microbiologist and Horticulturist and many thousands of pedigreed hybrids of considerable horticultural interest are now growing on to the flowering stage. The recent formation of our Orchid Society under the patronage of His Excellency the Governor has brought together the enthusiasts who are already beginning to place the cult of orchids in Jamaica on a basis of critical and eclectic endeavour.

CONCLUSION.

After serving for nearly 32 years in the agricultural services of the Colony, during which I have been privileged to see the remarkable progress of the people of Jamaica in all branches of agriculture, it is not without many and deep regrets that I am now forced by the relentless verdict of time to retire from active service.

In so doing, I desire to record my high appreciation of the support and encouragement afforded to the Department by His Excellency the Governor and the Colonial Secretary as Acting Governor, which have enabled quite outstanding improvements in equipment and organisation to be effected during the past five years. I also owe thanks to the loyal and effective support I have received from my colleagues, both in the Head Office, the Public Gardens, the Inspectorate of Plant Diseases, the Farm School and particularly from my scientific colleagues who have always been ready to devote their skill and energy to any practical problems which I have requested them to tackle. I also wish to record my high appreciation of the large number of faithful workers who have enabled us to carry on the Public Gardens, the Farms and Experiment Stations under conditions that have been pleasant and helpful to the Director.

H. H. COUSINS,

Director of Agriculture and Island Chemist.

Hope, February 19, 1932.

II.—PUBLIC GARDENS.

Report of the Superintendent and Horticulturist.

I. HOPE GARDENS.

Orchids.—The health of the Orchid collection was well maintained during the year and a continuous show of blooms was to be seen in the Orchid House where the flowering plants are arranged with other suitable foliage plants.

In September, a large number of the *Cattleya* group were badly damaged as the result of the careless discharge of a cylinder of chlorine gas into the air by an employee of the Kingston and St. Andrew Corporation who was operating the cylinder at the reservoirs adjoining the Orchid Nursery. The damage to the plants was soon apparent, the surface of the leaves turning black a few hours after the gas had passed over them. Fortunately, only a small number of the plants affected died but the disfigurement to the foliage will be seen for the next three years.

Good progress was made in establishing hundreds of young orchid seedlings from flasks. The young seedlings establish themselves in very finely chopped peat fibre and grow on steadily under our natural conditions. Our greatest worry is caused by minute insect life which seem to appear from nowhere and unless the young seedlings are carefully watched from day to day, it is possible for these insects to destroy numbers of the choicest seedlings in one night.

The following is a list of the *Cattleya* crosses from which a large number of seedlings are now growing in the Orchid Nursery:—

- C. Dowiana x C. Gaskelliana = Lord Rothschild
- C. Dowiana x C. Hardyana var. regalis = C. Prince John
- Slc. Magnet x C. Miss Measures
- Lc. Lustrissima x C. Maggie Raphael alba
- C. Dowiana x Bc. Olympus
- C. labiata x Bc. Mrs. J. Leeman = Bc. Ruby
- C. Dowiana x C. Miss Measures
- C. Miss Measures x Bc. Pallas

Twenty-six of the crosses which were sent to the Microbiologist during the year are now growing in flasks.

Four hundred *Cattleya labiata* were received from Brazil and are doing well.

A Jamaica Orchid Society was formed in October by a number of amateur Orchid growers resident in Jamaica. This Society is affiliated to the Royal Horticultural Society. The Society held its first Orchid Exhibition at Hope Gardens during the week-end December 18th to 20th, 1931. Hundreds of people were attracted to the Gardens while the Exhibition was on and the interest shown by the public in the plants exhibited was very encouraging to the members of the Society.

Mr. C. Williams of Williams' Nurseries, donated to the Gardens a collection of choice hybrid *Cypripediums*. These were very acceptable as our collection contained very few plants of this interesting group.

Twelve plants of *Dowiana aurea* were received from Mr. A. E. Lawrence, Colombia.

During the year numerous enquiries have been made by people interested in Orchid culture and the Department has always given advice on matters appertaining to the culture of Orchids.

Sunken Garden.—Operations were started on a Sunken Garden but after a few weeks on the excavation, work had to be suspended owing to a Government Order being issued to retrench on our Maintenance Vote.

Wire Screen.—A wire structure was put up to the west of the Head Office with the object of screening the building from the public view. Plants of *Bignonia venusta* have been planted to grow over the structure.

Cactus Border.—This was overhauled and cleared of all superficial growth. A number of native species of Cacti were collected from the Dry River and other districts and added to the collection of Cacti.

Aquarium and Plant House.—The Aquarium and Plant House erected last year is now well furnished and excellent Farleyense Ferns have been developed in this House. The Aquarium tanks are stocked with native fresh water fish and imported types of Japanese fish which have attracted large numbers of visitors.

Distribution of Plants.—During the year 14,450 grapefruit seedlings were distributed free to small settlers as follows:—

8,000 by Plant Disease Inspectors Wilmott and Russell in Portland.

5,000 by Rev. H. H. Simpson in St. Mary.

1,450 by Mr. M. N. Thompson, Agricultural Instructor in the Buff Bay Valley.

There were also distributed 56,846 seedlings of various native hardwood trees. The greater number of these seedlings were distributed through the Assistant Conservator of Forests.

During the year an Experiment Station was started at Grove Place and the following plants were supplied free from the Gardens:—

Coffee	..	..	..	500
Sour Orange	..	..	..	1,360
Grapefruit Seedlings	..	..	..	50
Sweet Orange	..	..	..	100
Budded Grapefruit	..	..	..	35
Miscellaneous Fruit Trees	..	..	..	92
				2,137

Agricultural Instructors were supplied free during the year with the following:—

144 buds of Marsh Seedless Grapefruit

49 budded plants of Marsh Seedless Grapefruit

12 grafted plants of Bombay Mango

for demonstration purposes. These plants will later be a source of supply of budwood for budding trees in their various districts.

General.—A portion of the Cacao Plot situated near the Water Garden was cleared and planted in grass. The site is very cool under the shade of several specimen trees of *Erythrina umbrosa* which are growing along the Water Garden from east to west. The situation is ideal either for planting trees which need a cool situation on the plains or one can visualise the site providing an excellent setting for a bandstand where afternoon band concerts can be given, thus affording an attraction in the Gardens so much enjoyed in similar settings abroad.

PLANTS DISTRIBUTED FROM HOPE GARDENS, 1931.

Sold.

Economic Plants—

Coffee	..	..	..	26,500
Cacao	..	..	..	46
Citrus—Seedlings	..	..	..	12,076
Citrus—Budded Plants	..	..	..	881
Mango—Grafted Plants	..	..	..	1,293
Miscellaneous	..	..	..	5,329

Ornamental Plants

..	..	..	..	46,125
..	..	..	..	28,027
				74,152

Free Grants.

Economic Plants:—			
Coffee	..	..	1,544
Cacao	..	..	30
Citrus Seedlings	..	..	19,508
Citrus—Budded Plants	..	..	129
Mango—Grafted Plants	..	..	29
Cane Tops and Cuttings	..	..	171,337
Elephant Grass Cuttings	..	..	9,800
Timber Trees	..	..	56,864
Miscellaneous	..	..	1,314
			260,555
Ornamental Plants	..	..	5,156
			265,711
Total Number of Economic Plants	..	..	306,680
Total Number of Ornamental Plants	..	..	33,183
			339,863

The following statement shows the distribution of plants for the last three years from the Nursery at Hope:—

	1931.	1930.	1929.
Coffee	28,044	39,660	50,581
Cacao	76	247	313
Citrus—Seedlings	31,584	65,494	13,225
Citrus—Budded Plants	1,010	1,633	968
Mango—Grafted Plants	1,322	1,729	676
Cane Tops and Cuttings	171,337	143,002	144,087
Elephant Grass Cuttings	9,800	17,600	20,640
Timber Trees	56,864	37,898	45,198
Miscellaneous Fruit and Economic Plants	6,643	3,113	4,510
Ornamental	33,183	31,288	30,847
	339,863	341,664	311,045

2. CASTLETON GARDENS.

In the early part of the year under review our finances allowed us to undertake the work of opening up the portion of the Gardens near the river into an attractive landscape. Years of growth which had completely hidden the view of the river from the Gardens was cleared away. The river banks soon became more attractive with neatly kept lawns leading down to the water's edge. The plantation of Cacao near the river was also cleared to provide more space for the increasing number of visitors to the Gardens during week-ends and public holidays. The site was planted with grass and within a few months neatly kept lawns took the place of the Cacao trees and now ample space is provided to accommodate the public.

A pleasing wooded landscape was also opened up near the river by cutting out a number of useless trees which had been allowed to grow up without any definite object in view.

These alterations have broadened out the Garden landscape generally and a very pleasing effect has been obtained by the removal of this unnecessary growth.

A piece of land was cleared near the lower entrance and planted with ornamental flowering and foliage plants. These plants have grown remarkably well in the past few months and are a definite improvement to this section of the Gardens.

Thirty-six plants of *Cassia nodosa* were planted through the experimental banana plot near the river with the object of obtaining an effective grouping of this beautiful pink Cassia which during its flowering season will be seen on approaching the Gardens.

Professor Bailey of Ithaca, New York, visited the Gardens on several occasions during his stay in the Island for the purpose of collecting specimens for study in connection with his work on the Palmaceae.

General repairs were done to the Garden Shelters.

Owing to the heavy rainfall of 148·87 inches for the year, the surface of the paths were continually being washed away and necessitated constant repairs.

PLANTS DISTRIBUTED FROM CASTLETON GARDENS, 1931.

Sold.

Economic Plants	..	..	98
Ornamental Plants	..	..	757
			850

Transferred to Hope.

Economic Plants	..	..	..	1,176
Ornamental Plants	..	..	..	15,535
				16,711
Total Number of Economic Plants	..	..	..	1,269
Total Number of Ornamental Plants	..	..	..	16,292
Total Number Plants distributed	..	..	..	17,561

4. PUBLIC GARDENS, KINGSTON.

The old Kingston Court House, which stood in the north-west corner of the Victoria Park, was demolished by the Public Works Department during the year. The site is being cleared of debris and it is understood that when the site is cleared it will be handed over to this Department to be laid out in conformity with the surroundings.

The lawns and flower beds in the Victoria Park looked fresh and green through the year chiefly owing to the regular rainfall.

The Jamaica Military Band gave band concerts at regular intervals.

Three *Cassia fistula* trees were planted on the lawn to the west of Seymour Place.

The general routine of maintaining the Kingston Gardens, the lawns around the Public Buildings, the Memorial Square, the old Treasury Site and Headquarter House Gardens was regularly attended to.

4. HILL GARDENS, CINCHONA.

There was a general saving on the Maintenance Vote for these gardens, consequently only work of a routine nature was done and the Gardens kept in a tidy condition.

A further collection of *Gladiolus* bulbs was received from Messrs. Vilmorin-Andrieux & Co., Paris, for the Gardens.

The demand for Christmas Trees (*Pinus* and *Cupressus*) was as large as in previous years and all the orders were supplied from the surrounding woodlands.

Quantities of Moss and Peat were gathered from the woodlands to supply the public demand.

5. KING'S HOUSE GARDENS.

An avenue of Royal Palms (*Oreodoxa regia*) was planted along the private drive leading to King's House. A number of palms on the lawn which had outgrown their usefulness in the garden landscape were removed.

The small orchid collection provided a very good show of blooms during the year and the condition of the plants has been well maintained.

The spacious lawns surrounding the house were seen in a green condition throughout the year owing to the continuous rains.

The pastures under the care of Mrs. L. A. Crooks and Mr. Harold Bolton were maintained in a satisfactory condition. The other pasture lands surrounding the Gardens were regularly cleaned by the Department.

The general routine work of mowing lawns, weeding shrubberies and attending to floral decorations in the house was regularly attended to by the Garden Staff.

6. GORDON TOWN GARDEN.

The small Garden at Gordon Town was maintained in a tidy condition out of the Hope Gardens Maintenance Vote.

7. BATH GARDEN AND NURSERY, (ST. THOMAS).

Seedling palms were grown from the Talipot palm which flowered in this Garden last year and two plants were set out in the Garden.

Several ornamental plants were re-established in beds which had almost become depleted owing to overhead shade.

The usual routine work was carried out and the Garden kept in a tidy condition.

Mr. R. Glen Campbell, Inspector of Plant Diseases, is in charge of this Garden and Nursery.

8. SUMMARY OF PLANTS DISTRIBUTED BY THE DEPARTMENT DURING THE LAST THREE YEARS.

	1931.	1930.	1929.
Coffee	28,044	39,660	50,931
Cacao	78	247	313
Citrus—Seedlings	31,584	65,494	13,225
Citrus—Budded Plants	1,010	1,633	968
Mango—Grafted Plants	1,322	1,729	676
Cane Tops and Cuttings	171,337	143,002	144,087
Elephant Grass Cuttings	9,800	17,600	20,640
Timber Trees	56,864	37,898	45,198
Miscellaneous Fruit and Economic Plants	6,734	3,872	4,954
Ornamental Plants	33,940	50,690	31,841
	340,713	361,825	312,833

9. The Garden and Plantation Sales for the last three years have been as follows:—

			£	s.	d.
1931	..	..	699	11	1
1930	..	..	761	19	9
1929	..	..	692	17	7

10. The Rainfall at the various Gardens for the year under review is as follows:—

1931.	Hope Gardens.	Castleton Gardens.	Public Gardens, Kingston.	Hill Gardens, Cinchona.	King's House Gardens.
January	2.36	21.73	0.96	14.58	1.38
February	1.82	4.54	0.07	2.98	0.71
March	2.82	7.92	0.70	4.03	2.67
April	5.21	15.61	0.99	7.34	3.24
May	6.05	9.99	3.93	6.64	5.85
June	6.37	7.70	2.97	5.92	4.27
July	8.43	13.79	6.96	8.72	5.96
August	2.68	3.83	1.69	4.89	2.22
September	7.43	8.98	4.15	11.21	8.41
October	11.55	22.68	5.90	18.61	9.94
November	5.39	28.45	3.90	16.88	3.24
December	1.76	3.65	1.95	3.71	1.03
	61.87	148.87	34.17	105.51	48.92

11. Contributions to the Gardens have been received from the following:—

Foreign.

Dr. Grabham, Madeira.
 Messrs. Vilmorin-Andrieux & Co., Paris.
 P. Vivian Joseph, Bogota, Colombia.
 Alister S. Gray, Beaulieu, Newbridge Hill, W., Bath, England.
 Director, Botanic Gardens, Singapore.
 Royal Botanic Gardens, Kew, England.
 United Sugar Companies, S.A.
 Dr. Augusto Bonazzi, Habana, Cuba.
 Dr. Carl Fiebrig, Jardin Botanico, Paraguay.

Local.

Chas. Costa, Orange Valley, Brown's Town.
 Jamaica Agricultural Society, Kingston.
 Sir J. A. Swettenham, Belle Vue, Gordon Town.
 Major Thursfield, Newport.
 Mrs. Donat Delgado, Falmouth.
 Sir A. W. Farquharson, Fort George, Stony Hill.
 David Watt, Red Hills, Halfway Tree.
 Mrs. L. I. Drummond, Camperdown, Halfway Tree.
 J. P. Dewar, Harmony Hall, Duncans.
 G. R. Smith, Retréat, Brown's Town.
 Mrs. B. Crowden, Bridge Pen, Halfway Tree.
 Chas. Williams, Swallowfield, Cross Roads.
 F. E. V. Smith, Government Laboratory, Hope.
 Mrs. G. O. Rushie-Grey, Halfway Tree.

M. S. GOODMAN,
 Superintendent of Public Gardens.

E. J. DOWNES,
 Horticulturist.

III.—AGRICULTURAL EXPERIMENTS.

Report of the Acting Superintendent of Agriculture.

The year under review has been one of an exceptionally good rainfall which was well distributed over the year. It was far above the average for the past 60 years. Several estates had to leave over canes owing either to the bad condition of the estate roads or to the poor quality of the cane juice. Some of those estates which persevered and finished their reaping did so at a big loss as at one period it was taking from 18 to 24 tons of cane to make a ton of refined sugar. The heavy rainfall of 1931 will however result in a large tonnage for the 1932 crop and most of the factories which are already in operation will make the largest crop on record. Already very large tonnages have been reaped from the S.C. 12/4 which is a very promising cane in some districts but not suited to others.

Owing to the very low price of sugar for the past two years some estates have not done any cultivation for replanting this year.

Bananas.—Owing to the slump in the banana market, there are to be seen several fields of neglected bananas scattered over the Island.

Mosaic.—Mosaic Disease, although prevalent in ratoon fields in some districts, is steadily decreasing due to the extensive planting of the improved Java varieties which are highly resistant to the disease. The small settlers are realising the loss they suffer from this disease and the demand for cuttings of the Java canes has greatly increased. This is a big strain on the small amount of land available in the Experiment Station which is under irrigation for growing these varieties to cope with the increasing demand.

Canes.—Several estates which were obliged during the earlier period of the outbreak of Mosaic Disease to plant Uba cane to assist in the control of this disease and to take the place of the susceptible varieties are now planting the superior resistant Java varieties. These have proved a boon to the planters as they are cheaper to reap than the Uba.

B.H. 10 (12) and Ba. 11569 continue to give good results and while suitable for certain soils do not give as good results as the S.C. 12/4 in other soils. Reports from the Vere district are that the S.C. 12/4 is giving marvellous results and it also appears to ratoon well on the Vere soils while on some of the soils in Westmoreland it is useless as a ratooning cane.

The E.K. 28 while giving heavy yields in some of the Vere soils is not such a promising cane in other cane districts.

The P.O.J. 2725 is showing good promise and is liked by planters in the rainy district as owing to its peculiar growth it covers over the land quickly and saves weeding which is costly in some places. This cane is such a strong grower that it is known to kill out Uba in the same field. The tonnage obtained from this cane is comparable with the other varieties but its greatest drawback is its early arrowing as ratoons which reduces its yield.

P.O.J. 2714 is promising in the rainy districts and has also been tried out in some of the very dry districts. It is showing up well compared with other varieties.

P.O.J. 2727 is finding disfavour with the planters owing to several reasons. (1) It has a very poor juice. (2) It is both pithy and hollow and very deceptive in forming an estimate of tonnage. (3) It is very susceptible to Root Disease and therefore does not ratoon well.

P.O.J. 2878 has not been grown long enough on a large scale for us to form a general opinion but it is a very promising cane in growth. It is a good germinator and very fast grower and likes plenty of moisture to be at its best. This cane apparently is not as deep-rooted as the other Java varieties and turns up by the roots during high winds. Perhaps this difficulty may be overcome by deep planting and high moulding of the canes. We hope next year to be able to give results from this variety.

It is pleasing to report that the planters are taking a great deal of interest in the new varieties and are trying them out on a large scale under their varying soil conditions and rainfall. Planters have also been conducting manurial experiments on a large scale with various organic manures and it is very interesting to see the results some of them have obtained.

Varietal Experiments.—Several experiments were laid out by the planters under our instructions but these, owing to the continuous rainfall and a depressed feeling, were not reaped separately and no results were obtained. Although several juices were sent in for analysis from the plots, they were not reaped separately and therefore no comparison could be made.

Manurial Experiments.—Several of these were lost owing to the reasons given above, but several series of experiments are being conducted all over the Island for the 1933 crop and we hope to be able to give some interesting results.

The results of the plots reaped at Morelands, Vere, should not be taken seriously as the canes in these plots rotted badly due to the heavy rains experienced and it was noticed that the canes in some of the plots rotted worse than others.

At Llandovery the results that were obtained from manuring the ratoons are noticeable. In the ratoons the same manures and the same quantities were applied to each plot as were given to the plant canes. The following are the results:—

Estate—Llandovery.

Field—Plantain Walk.

Plot.	Treatment per acre.		Yield per acre.		Average Yield. Plants and Ratoons.	Increase or Decrease per acre.	Cost of Manures per acre.	Profit or Loss per acre.
	Plants.	Ratoons	Plants.	Ratoons.				
2	Control	..	59.50	69.50	56.15			
5	do.	..	50.00	56.00				
8	do.	..	56.50	52.00				
11	do.	..	60.50	53.50				
14	do.	..	56.00	48.00				
1	Sulp. Ammonia 2½ cwt.	do.	62.00	59.00	60.50	+ 4.35	37/6	+ 1/9
3	Ammo.-Phos. 2½ cwt.	do.	60.00	65.00	62.50	+ 6.35	41/5	+ 15/10
4	Nit. Soda 2 cwt.	do.	67.00	60.50	63.75	+ 7.60	43/1	+ 25/5
6	Nitrolim 2 cwt.	do.	57.00	48.00	52.50	— 3.65	20/	— 52/9
7	Sulp. Potash 2 cwt.	do.	58.50	47.00	52.75	— 3.40	29/6	— 59/6
9	Superphos. 3 cwt.	do.	59.00	57.50	58.25	+ 2.10	19/6	— /6
10	Sulp. Ammonia 2 cwt.	do.	68.00	70.00	69.00	+ 12.85	44/9	+ 71/
	Sulp. Potash 1 cwt.							
12	Nit. Soda 2 cwt.							
	Sulp. Potash 1 cwt.	do.	68.00	65.50	66.75	+ 10.60	49/3	+ 46/3
13	Sulp. Ammonia 2 cwt.							
	Sulp. Potash 1 cwt.							
	Superphos. 3 cwt.	do.	71.00	50.50	60.75	+ 4.60	64/3	— 22/9
15	Sulp. Ammonia 2 cwt.							
	Sulp. Potash 2 cwt.							
		do.	76.50	53.50	65.00	+ 8.85	59/6	+ 20/3

Estate—Morelands.

Field—Carrion Crow, Series I.

Plot.	Description.	Sulp. Ammonia.	Ammo-Phos.	Nitrate of Soda.	Super- phosphate.	Sulp. Potash.	Per Acre.			
							Cost.	Tons Cane.	Increase.	Profit or Loss.
1	Control ..	cwt.	cwt.	cwt.	cwt.	cwt.				
2	Nitrogen ..	2 $\frac{1}{2}$	..	..	..	..	} Damaged and reaped.		could not be	
3	do. ..	..	2 $\frac{1}{2}$	..	..	..		38.00		
4	Control ..	..	..	..	..	..	34/6	40.50	+ 1.50	-21/
5	Nitrogen ..	..	..	2	..	..	14/9	40.00	+ 1.00	- 5/9
6	Potash ..	..	..	..	..	1		40.00		
7	Control ..	..	..	..	..	..	19/6	28.50	- 8.50	-96/
8	Phosphates ..	..	..	..	3	..	44/9	34.50	- 2.50	-67/3
9	Nitrogen and Potash ..	2	..	..	..	1		34.00		
10	Control ..	..	..	..	..	..	89/6	46.50	+11.50	+24/
11	Nitrogen and Potash ..	4	..	..	..	2	49/3	45.50	+10.50	+45/3
12	Nitrogen and Potash ..	..	..	2	..	1		36.00		
13	Control ..	..	..	..	..	..	64/3	41.50	+ 5.50	-14/9
14	Complete ..	2	..	..	3	1				

Estate—Morelands.

Field—Carrion Crow, Series II.

Plot.	Description.	Sulp. Ammonia.	Ammo-Phos.	Nitrate of Soda.	Super- phosphate.	Sulp. Potash.	Per Acre.			
							Cost.	Tons Cane.	Increase	Profit or Loss.
1	Control ..	cwt.	cwt.	cwt.	cwt.	cwt.				
2	Nitrogen ..	2 $\frac{1}{2}$	..	..	..	..	} Damaged and reaped		could not be	
3	Nitrogen ..	..	2 $\frac{1}{2}$	..	..	..		32.50		
4	Control ..	..	..	..	..	..	43/1	33.00	-1.00	-52/1
5	Nitrogen ..	..	..	2 $\frac{1}{2}$	..	..	14/9	31.00	-3.00	-41/9
6	Potash ..	..	..	..	..	1		35.50		
7	Control ..	..	..	..	..	..	19/6	32.50	- 4.25	-57/9
8	Phosphates ..	..	..	..	3	..	44/9	32.00	- 4.75	-87/6
9	Nitrogen and Potash ..	2	..	..	..	1		38.00		
10	Control ..	..	..	..	..	..	59/6	40.50	+ 6.00	- 5/6
11	Nitrogen and Potash ..	2	..	..	..	2	74/9	39.00	+ 4.50	-34/3
12	Nitrogen and Potash ..	4	..	..	..	1		31.00		
13	Control ..	..	..	..	..	..	64/3	39.00	+ 8.00	+ 7/9
14	Complete ..	2	..	..	3	1				

M. S. GOODMAN,
Acting Superintendent of Agriculture.

EXPERIMENT STATION, HOPE.

Report of the Plant Breeder.

Canes.—During the year 171,339 tops and cuttings of the various varieties of Sugar-cane were distributed, more than in the two previous years, and making a total of 3,896,273 tops and cuttings distributed free to both the small cane farmers and the estates for the past 12 years. A large number of cuttings of the resistant varieties was distributed. During the Spring there was a big demand for the P.O.J. 2878 but, unfortunately, at this time there was only a limited supply owing to the drought in the latter part of 1930 and January and February of the present year, but we were able to supply a large number of cuttings for the Fall planting.

During 1930 cuttings of B.726 and B.891 were sent us by the Director of Agriculture, Barbados. These were grown under quarantine at the Laboratory for a period of nine months and having remained free from disease for that period they were cut up and replanted in the Experiment Station but, unfortunately, after a period of four months every stool developed Mosaic Disease although they were persistently rogued. Cuttings were again taken from the old stools which had remained free from Mosaic and planted in another section away from other varieties.

There has been a big demand for P.O.J. 2878 and 33,549 cuttings were distributed during the year. We hope to be in a position during 1933 to supply all orders in full. This cane is a very fast grower and from our short experience it appears to do better in a light to clay loam soil than in a heavy clay. It shows promise of being a good ratooning cane on the light lands of the Experiment Station. It would appear, unfortunately, that this cane cannot resist high winds as during the high winds experienced at Hope in September, when a hurricane was passing to the north of the Island, most of our plant canes which were then about six months old were damaged by turning over by the roots. Some of the ratoons were also damaged. This cane, under our conditions, seems highly resistant to Mosaic and also other local diseases. It does not arrow as freely as the P.O.J. 2725. Large numbers of the P.O.J. 2878 are being distributed through the Agricultural Instructors to small cane farmers. This variety will be a great help to small cultivators who have their cane fields infested with Mosaic as it is very difficult to get them to rogue their fields.

The P.O.J.s 2725, 2727 and 2714 continue to give good results under conditions suitable to them. The P.O.J. 2727 is not as much in prominence as the other two varieties. This variety suffers badly from root disease.

The B.H. 10 (12) is now the standard cane in the Island and gives good results both as plant canes and ratoons.

The S.C. 12/4 is considered a very good cane and on some soils gives much better results than the B.H. 10 (12) but on some soils it is a very poor ratooner. It is an early ripening cane and good use should be made of it on estates where reaping has to be begun in December.

Ba. 11569 is not as much in prominence now as previously owing to the rotting of a large percentage of the canes that lie on the ground.

Several plots of old canes in the Station were discarded, ploughed out and replanted with the newer and better varieties.

Bananas.—The section which was set out in October, 1929 and which yielded a good plant crop in 1930 gave promise of a very good first ratoon in 1931 but the high winds in May blew down about 50%. The section consisting of second ratoons was given up to the Microbiologist for the purpose of experiments with chemicals in connection with the killing of bananas. It was reclaimed in September and a part of it replanted in October. Trapping for borers was continued and it is pleasing to report that this pest is now almost eradicated. The following varieties are under cultivation:—Gros Michel, Robusta, Lacatan, Rubra, Ram Kelat, Apple, White House, Cavendish.

Citrus.—The old section benefited very much from the good rains which fell during the year. Pruning and spraying with Lime Sulphur Wash were performed during the year and the majority of the trees present quite a healthy appearance. Three of these trees showed signs of root disease and gummosis and were eventually destroyed. Quite a good crop of clean fruit was reaped. The section set out in 1930 consisting of Marsh Seedless received careful cultivation and a liberal supply of humus. They were also sprayed on three occasions during the year with Lime Sulphur Wash against Citrus Black Fly. From these young trees several thousand buds were obtained for the nursery.

Coffee.—Cultivation of the young coffee plot was continued during the year and those that died were supplied in October. The Long-Top section planted out in 1929 commenced bearing during the year and the Short-Top section gave a very good crop. The berries were harvested and cured by the Students.

Cacao.—The usual pruning was carried out. A few trees were partially destroyed by the effects of the heavy winds in May and these were replaced by the encouragement of gormandizers. One-half the plot was taken over by the Gardens for the establishment of a lawn for the benefit of the public. A good crop was reaped and the beans were cured by the Students.

Cassava.—A varietal test is being carried out consisting of the following varieties:—

Bitter—Blue Bud, Cotton Tree, Bunch of Keys, White Stick, Spanish Town, Hanover, Malta Hotel.

Sweet—George Blade, New Stick, Yellow Belly, Spanish Town, Blue Bud.

The sweet varieties were reaped during the year. George Blade and Yellow Belly varieties proved very prolific bearers whilst the other three were only fair. Only the first two have been replanted. The bitter varieties will be reaped very early in 1932.

Peanuts.—A small plot consisting of $\frac{1}{2}$ sq. chain was set out 3 ft. by 1 ft. in the month of May. Only ordinary seeds could be obtained locally and as a result a little under 50% germinated. The soil was first well pulverized and good tilth was maintained throughout early in October. These were reaped and gave a return of one bushel of good quality seeds.

Agricultural Education.—The Farm School Students as in previous years continued to visit the Experiment Station for five days each week. They carried out experiments in the School Garden with various vegetable crops and received instructions in nursery work as well as in the various methods of cultivation of the different crops.

M. S. GOODMAN,
Plant Breeder.



JAVA SUGAR CANE "P.O.J. 2878",
HOPE EXPERIMENT STATION.



H. H. COUSINS, M.A. (OXON)
(DIRECTOR 1908—1932).

IRRIGATION EXPERIMENTS IN THE PEDRO PLAINS.

The irrigation experiments started last year in the very dry area of the Pedro Plains in St. Elizabeth on lands of Mr. Brodie, Williamsfield, were continued this year under the supervision of Mr. E. M. Falloon.

The experiments were divided into two plots. Plot I, approximately 6½ acres, was irrigated from a well at the side of the plots. This well which was 49 ft. deep was sunk to a depth of 60 ft. by the Public Works Department and a Blackstone Engine for pumping the water was also installed by them.

The bananas were not a success due to unfavourable soil conditions except one small area where there was an old pen and in this small area the plants fruited nearly all ten hand bunches. The Pedro Plains are also exposed to high winds nearly all the year and therefore are not suitable for banana growing.

Budded grapefruit, grapefruit seedlings and grafted Bombay mango plants were set out between the rows of bananas and these, under irrigation, are doing well.

Vegetables such as cabbages, tomatoes, cauliflower, onions, lettuce, egg plant and Irish potatoes were tried in this plot and gave good results. From one square chain cabbage 135 heads weighing 580 lbs. were obtained; 35 tomato plants gave 157 lbs.; 15 plants cauliflower gave 40 lbs., etc. These were grown under irrigation.

Plot II, approximately 2½ acres, is irrigated by water pumped by an aermotor from a well in the plot into a storage tank of 10,000 gallons capacity. This was a failure, as it often took two weeks, during light winds, to fill this tank which could be emptied in two hours and most of the time the plants in this plot suffered from shortage of water.

Bananas planted in this plot were a failure owing to bad soil conditions and want of moisture.

Cassava, cabbage, cauliflower, tomatoes, lettuce, Irish potatoes and tobacco were tried in this plot and gave very good returns. Four square chains of tobacco yielded 225 lbs. of dry leaves which is considered good for this district. One square chain of tomatoes yielded 1,475 lbs. large marketable fruit. Peanuts were tried in this plot but the results were very poor.

On the whole it appears that with irrigation vegetables can be successfully grown and there is a ready market for them at Black River and Malvern.

The Montgomery Red Poll Bull which was sent to the Pedro Plains in the care of Mr. Bennett, Mountain-side, for the use of the small settlers of the district to improve their stock was made little use of the first year owing to the people not being advised as to the usefulness of this particular breed for improving their meagre animals. This year the Supervisor of the experiments made special visits among the people and advised them as to the usefulness of the bull. As a result a number of cows were sent to the bull and in the future his progeny will be seen in this district.

M. S. GOODMAN,
Acting Superintendent of Agriculture.

IV.—DISEASES OF ANIMALS.

Report of Government Veterinary Surgeon.

Introduction.—Vacation leave of approximately seven months (April 1st to October 28th) was granted to me during the year.

The vacation was spent in England, where through the courtesy of the Colonial Office I paid interesting visits to many places of agricultural and scientific importance, in particular I should mention the London School of Tropical Medicine, Rothamstead Experiment Station, the Laboratory of Parasitology at Winches Farm (St. Albans), the Laboratories of Animal Pathology at Weybridge (Surrey) and at Cambridge, and the School of Agriculture of the University of Cambridge.

At the Institute of Animal Diseases at Cambridge, by arrangement with the Director I spent a full month studying some methods of diagnosis.

During my absence, Dr. Vincent Tavares of Kingston was appointed to act in my official capacity.

1. GOVERNMENT FARM SCHOOL AT HOPE.

Whilst on service during the year, I continued to give lectures and demonstrations in veterinary science to the three classes of students at the School on a basis of three periods of two hours each per week.

The curriculum outlined in Report of 1930 has been followed as closely as circumstances permitted. Lectures were supplemented with demonstrations on the Farm animals.

2. GOVERNMENT STOCK FARM AT HOPE.

The year was unusually rainy for the Farm, but the cattle came through very successfully on the whole apart from an increase of bad feet above that of other years.

Tuberculosis.—The annual tuberculin test (intradermal method) was carried out December 4th-8th, and comprised the testing of all the cattle on the Farm, except 19 calves under three months of age.

Animals tested.—5 imported bulls, 18 native bulls and bulkins, 180 cows, 133 heifers and 12 working steers. Total 348.

Result of test.—One reactor, namely Cow, Baby 5th.

This animal was killed on the Farm and showed small tuberculous lesions in two mesenteric glands. The following table shows the status of this disease at the Farm since 1927:—

Month.	Number Tested.	Result.	Percentage Infection.
Jan., 1927	359 head.	20 reactors.	5.56%
July, 1927	303 head.	1 reactor.	0.33%
Dec., 1927	312 head.	1 reactor	0.32%
Nov., 1928	297 head.	1 reactor.	0.33%
Oct., 1929	342 head.	1 reactor.	0.29%
Aug. and Oct., 1930	326 head.	No reactors	Nil.
Dec., 1931	348 head.	1 reactor.	0.28%

Imported Bulls. (i) No importations of cattle to the Farm were made during the year.

(ii) The following imported bulls were carried successfully through the year:—

- (a) Montgomery, Sanhiwal Pusa, born July, 1917 and arrived from India, Nov. 24th, 1920.
- (b) Red Poll, Leona's True Lad; born Nov., 1924 and arrived from U.S.A. in Feb., 1929.
- (c) Jersey, Sophie 19th's Victor 63rd, born August, 1927 and arrived from U.S.A. June 17th, 1929.
- (d) Guernsey, Foremost Monogram; born November, 1924 and arrived from U.S.A. June 17th, 1929.
- (e) Holstein-Friesian, Sir Francy Romeo Posch; born December, 1926 and arrived from Canada in June, 1930.

(iii) The Holstein-Friesian was the only one from the North which had an attack of tick fever during the year, namely on October 27th, with successful recovery.

The Red Poll, Jersey and Guernsey are regarded as reliable immune subjects subsequent to their attacks of fever in 1929 and 1930.

The Holstein early in January sustained a bad gore wound from another bull, but recovered after weeks of treatment.

Blackleg (Clostridium chauvei).—No cases of this infection occurred during the year, but preventive vaccination, as instituted in 1927 when there was an occurrence, has been maintained.

On February 26th all the cattle under 2 years of age were vaccinated. Number so treated was 89 head.

Parturition Record of the Farm.—(a) There were 126 full term births, 9 cases of abortion and 12 cases of retention of foetal membranes.

(b). 125 calves were born alive (73 bulls and 52 heifers). Of these 8 were lost—5 died or were killed on account of congenital weakness, 2 from acute gastro-enteritis and one from infection of the skull subsequent to dehorning.

Considering that practically every heifer calf at Hope is pail-reared—the bull calves are usually sold a few days after birth—the loss from gastro-intestinal troubles is remarkably small.

Mastitis.—Six cases occurred among the milking cows whereupon they were removed from the milking group until recovery.

Fouls of the Feet.—This trouble has been much more frequent this year than usual by reason of unusual rains. Besides minor injuries and foot infections there were 8 severe cases dealt with. All except two had recovered at the close of the year.

Death List.—

Animal.		Cause of Death.
Heifer, Pet 3rd.	∴ ∴	Accidental fracture of neck in stanchion.
Cow, Monica 7th	∴ ∴	Impaction of 3rd stomach.
Cow, Badge 4th	∴ ∴	Parturient paresis.
Working Steer, Rajah.	∴ ∴	Septic pneumonia subsequent to injury of his throat by yoke bow.
Cow, Violet 2nd	∴ ∴	Killed because of senile emaciation.

Farm Poultry.—No contagious disease occurred in the flock (Rhode Island Reds) during the year.

In the past fowl pox (epithelioma contagiosum) has occasionally appeared in mild form and with little or no mortality.

Since the 1927 experience with fowl cholera, the poultry have been annually immunized against this infection by subcutaneous injections of Hemorrhagic Septicæmia Aggression.

On February 26th, this annual vaccination was done on the 13 cocks and 60 hens at the Farm.

Losses during the year were:—Imported Canadian rooster from sarcomatosis, 2 hens from peritonitis arising from rupture of a yolk sac, 1 hen from ascites, 1 hen from traumatic injuries, 1 hen from eversion of the cloaca, 1 hen from impaction of the crop and 1 hen from undetermined cause (no autopsy made).

3. GOVERNMENT STUD FARM, GROVE PLACE.

Horsekind.—The stallion, Royal Highness, kept well and efficient throughout the breeding season, but later suffered from lymphangitis of the pasterns in both hind limbs and a recrudescence of his ringbones in the forelimbs.

The jack, Kentucky Boy, is showing the effects of age. The bad keraphyllatous condition of his front hoofs still persists but has not caused lameness.

Only five of the nine brood mares of the Farm foaled during the year—2 colts, 2 fillies and one mule cub were born.

Of the two breeding jennies only one produced offspring.

The mares have been systematically treated with Paranaph and Arsenite of Soda for the control of mange which is under better control than in the past.

Only one of the horsekind was lost during the year, namely a yearling mule killed because of lack of development.

Cattle.—(i) The stud bulls of the Farm for the year were one imported Jersey, Glen's Fontaine Lad, one native born Ayrshire Food Comptroller, one native born Jersey, one Montgomery—Guernsey, and one Montgomery—Brown Swiss.

All have been healthy and efficient stud animals, except the imported Jersey, whose service record indicates sexual sterility. There has been very little demand for the services of the Ayrshire.

(ii) No tuberculin test was made this year. Up to the present complete tests of the herd made every three years (1924, 1927, 1930) have revealed no infection.

(iii) Blackleg. Preventive vaccination of age-susceptibles has been maintained as in past years.

(iv) Parturition Record.—23 normal calves were dropped (9 males, 14 females): one still-birth: no cases of abortion.

(v) Death List.—

1. One yearling heifer from collision with a motor car.
2. One cow calf from accident in dipping tank.
3. One cow, Iona, from pneumonia.

4. Diseases under The Contagious Diseases Animals (Inland) Law.—(i) Foot and Mouth Disease.—

Only one report of the suspected occurrence of this infection was received, namely, from the Green Pond District near Montego Bay (March 26th).

Its investigation showed no symptoms really indicative of the disease. The trouble consisted of a warty condition of the lips and muzzle of several young goats. Cattle in immediate association with these goats were healthy and free of any suggestive lesions.

(ii) *Anthrax*.—Five outbreaks were dealt with under the Law and effectively controlled by quarantine and vaccination. Two occurred in the Moneague area of St. Ann, two in St. Elizabeth and one in St. James near Montego Bay.

In addition three negative outbreaks were investigated—one on a sugar estate in Trelawny, one in Manchester and one on a sugar estate in St. James.

5. DEPARTMENTAL ASSISTANCE.

(i) *Tuberculosis*.—A tuberculin test of a dairy herd in Manchester consisting of 1 bull, 25 cows and 2 calves was performed at the request of the owner. No reactors were found.

(ii) *Tick Fever*.—Four owners were assisted with trypan blue injections in outbreaks of acute tick fever.

(iii) Two occurrences of suspected poisoning of cattle were investigated for the owners. One proved to be lead poisoning (carbonate of lead) from exposure to house paints on the premises, the other to arsenic from probable malicious use of Arsenite of Soda obtained from dipping tank operations.

(iv) *Urechites poisoning*.—Two suspected cases of poisoning from this plant were investigated without definite results. In a third case on a property in St. Ann in which six apparently healthy cattle died suddenly, the stomach and intestinal contents were shown by chemical examination to contain this poisonous plant.

(v) Veterinary services to the Public Works Department when requested.

(vi) Veterinary services at the Lunatic Asylum in connection with sheep kept there.

6. *Tick Control*.—(i) No regulatory inspection of cattle and tanks was conducted. Judging, however from the sales of Paranaph and Arsenite of Soda as below, it is evident that dipping is still being maintained on many properties:

SALES OF PARANAPH:—

	1927.	1928.	1929.	1930.	1931.
Paranaph ..	29,954	37,353	37,849	33,512	36,770 lbs.
Arsenite of Soda ..	17,475	21,900	21,725	20,175	25,499 „

(ii) Number of Registered Dipping Tanks:—

1928.	1929.	1930.	1931.	Increase.
305	329	341	351	10

7. ASSISTANCE IN EDUCATION.

No course of lectures was conducted this year for the Agricultural Instructors of the Jamaica Agricultural Society or for the Sanitary Inspectors of the Health Department.

8. INSPECTION OF IMPORTED ANIMALS.

Certificates for landing under Law 24 of 1890 were given for:—Seven racehorses—4 from England, 3 from the United States. One pony from Grand Cayman. Seventeen cattle—2 bulls (Hereford and South Devon) from England, 15 Holstein heifers from the United States. Eleven goats from the United States. Thirty-three dogs—all from England.

9. DISEASES OF BEES UNDER THE PROTECTION FROM DISEASES (BEES) LAW, 1918.

No occurrences of these listed diseases had to be dealt with during the year. The first appearance of American Foulbrood was in 1918 when it was eradicated by incineration of all infected and exposed apiaries. The second appearance of the infection was in July, 1926. This outbreak was handled by quarantine and systematic inspection of all apiaries within Lower St. Andrew and Kingston. It entailed a quarantine period of 21 months ending March 31st, 1928.

S. LOCKETT, V.M.D.,
Govt. Veterinary Surgeon.
February 10th, 1932.

V.—PLANT DISEASES AND PESTS.

Report of the Secretary of the Advisory Committee on the Banana Industry.

The membership during 1931 was:—H. H. Cousins, Esq., M.A., Director of Agriculture (Chairman), Hon. J. H. McPhail, Hon. P. Lindo, Hon. T. J. Cawley, Hon. K. V. Abendana, Messrs. F. A. Cory, J. R. Johnson, G. J. Goble; L. L. Carrington (Secretary, Jamaica Agricultural Society), the Supervising Inspector of Plant Disease, and F. E. V. Smith, Government Microbiologist (Secretary). The following members were granted leave:—Hon. P. Lindo, Mr. J. R. Johnson, and Mr. L. L. Carrington. Mr. E. Arnett acted during Mr. Carrington's absence.

Three regular meetings were held during the year. As hitherto, the routine and less important matters were dealt with by means of circulated papers, sixty-five of which were issued during the period under review.

The Committee considered the question of the future of Panama Disease control in the parish of Portland. In view of the results of the first year of decontrol in this parish, it was decided that it would be advisable to withdraw completely and permanently from this parish. Meanwhile, the Committee advocated that propaganda work should be continued if possible through the Agricultural Society and everything should be done to foster the Citrus industry in the parish until such time as a suitable banana resistant to Panama Disease and acceptable to the market, could be produced. In order to further this work of banana breeding the Committee recommended to the Government that the Geneticist be immediately appointed.

The Committee considered on several occasions the Panama Disease situation in the parishes of St. Catherine and St. Mary emphasizing the need wherever necessary of prosecution in order to maintain adequate control of the disease in both places.

As a result of the experiments carried out by the Microbiologist, the Committee recommended to the Government that a new Panama Disease Order be issued permitting the use of approved Gas Oils for the killing of bananas in Panama Disease treatment. This recommendation was accepted by the Privy Council and the Order was amended accordingly.

The results of the third year of the large-scale experiments on Panama Disease treatment in the parish of St. Mary, carried out by the Microbiologist, were considered by the Committee. It was decided as a result of these experiments that it was not advisable to withdraw the nine-root treatment as the experiments indicated that one-root treatment showed a marked cumulative effect upon the spread of the disease after the first year. The Committee further recommended that one-root "Salvage" treatment should only be given in very extreme cases and then only when permission had been obtained from the owner to "Gazette" the property as an infected area. Details of these experiments are given in the report of the Microbiologist.

The summary of the incidence of Panama Disease for the year 1931 is appended.

F. E. V. SMITH,

Government Microbiologist and Secretary to the Committee.
25.1.32.

Summary of Incidence of Panama Disease in parishes other than Portland in 1931:—

Parish.	Diseased Plants.	New Cases.	Recurrences.	Total Cases.
St. Mary ..	51,778	776	32,403	33,169
St. Thomas ..	7,102	651	4,033	4,684
St. Ann ..	4,543	153	1,877	2,030
Trelawny ..	782	6	266	272
St. James ..	12,844	179	3,815	3,994
St. Catherine ..	10,896	894	7,299	8,193
Hanover ..	618	29	324	353
Clarendon ..	5,667	330	1,655	1,985
Manchester ..	384	43	95	138
Westmoreland ..	1,404	23	638	661
St. Elizabeth ..	40	5	4	9
St. Andrew ..	155	23	26	49
Total 1931 ..	96,213	3,102	52,435	55,537
Total 1930 ..	73,315	2,670	39,471	42,141
Total 1929 ..	36,661	2,417	18,224	20,641
Total 1928 ..	17,005	1,776	7,987	9,763
Total 1927 ..	11,088	1,193	4,822	6,015
Total 1926 ..	6,785	759	2,199	2,958
Total 1912 to 1931 (excluding Portland)	249,274	13,114	127,498	140,612

MONTHLY TOTALS..

	Diseased Plants.	New Cases.	Recurrences.	Total Cases.
January ..	6,690	206	3,366	3,572
February ..	8,998	240	4,793	5,033
March ..	8,701	239	4,735	4,974
April ..	9,989	220	5,437	5,657
May ..	6,648	235	3,916	4,151
June ..	6,160	175	3,407	3,582
July ..	7,335	298	4,373	4,671
August ..	6,421	310	3,190	3,500
September ..	8,164	286	4,904	5,190
October ..	8,516	253	4,323	4,576
November ..	9,669	307	5,657	5,964
December ..	8,920	333	4,334	4,667

F. E. V. SMITH,

Microbiologist,

25.1.32.

PLANT DISEASES IN JAMAICA IN 1931.

Report of the Government Microbiologist.

The work of this Division during the year, apart from the normal routine advisory work and Panama Disease control, has been directed to three main investigations. The elaboration of the experiments on killing bananas with chemicals; the raising of Orchids by a new modification of the asymbiotic method worked out by the writer; and an investigation into the storage rots of citrus fruits.

Field work has been very considerably reduced on account of the reduction in expenditure necessitated through the financial situation.

GENERAL.

The rainfall of the Island has been much heavier during 1931, than for several years past, especially during the summer months. The most noticeable effect of the wet weather was in the increase in the amount of stem-end rot and blue mould in citrus, and to a certain extent the stem rot in bananas shipped from the Island. The interest of planters in the general health of their crops has continued to increase, and in consequence a variety of inquiries of a less stereotyped nature have been received in addition to which the various branches of the Producers' Association have submitted problems from time to time. All this being indicative of a greater interest in the health both of the plant and its products.

It is necessary to repeat what has been stressed in former reports that with one or two exceptions the bulk of the plant disease problems in Jamaica are due either to improper cultivation, or lack of knowledge of the requirements of many of the crops which are grown. This especially refers to the smaller and less commonly grown crops and vegetables with which growers are experimenting from time to time with the hope of entering northern markets. Many other diseases however, of the larger Jamaican crops are also due to improper planting and cultivation or choice of suitable situations for such crops. Among disease of this character may be mentioned Root Diseases of Sugar Cane, Leaf Diseases of Coconuts, and Roots Diseases of Citrus and certain other crops.

BANANAS.

Panama Disease (Fusarium Cubense, E.F. Sm.)—In view of the results of the first year of decontrol in the parish of Portland it was decided to withdraw totally Inspectors from that parish. As a result of the withdrawal of Government control in 1930, some new lands were planted up by both settlers and larger planters in this parish. The effect of termination of Government inspection was an almost immediate and general cessation of Panama Disease treatment by the bulk of the planters in the parish. As a result, the disease increased rapidly and a great deal of infected planting material was used in new land, resulting in rapid infection of these new cultivations. The matter has been fully discussed in my report on the parish in the Jamaica Gazette.

In spite of heavy rains throughout the year, the incidence of the disease in the parishes other than Portland showed only the relatively small increase of 31% over the previous year. This is the lowest rate of increase since the year 1923, and a vast improvement over both 1930 and 1929, in which years the increase was 100 per cent. or greater. The parishes showing the largest relative increase in 1931 were St. Catherine and St. James. The continuous flooding of the rivers in St. Catherine due to the abnormal rainfall was responsible for a large portion of this increase, although a certain proportion of such increase was undoubtedly due to obstruction towards the Government regulations. On account of the heavy rainfall, not only in the mountainous parts of the parish of St. Catherine, but also in the irrigated coastal plain, there was a long period during the year when irrigation with water from the Rio Cobre river was unnecessary. The spread of the disease therefore in the irrigated area was relatively small and less than in the previous years. There has been no recurrence of the disease in the irrigated area of St. Andrew during 1931, and only a small increase in the irrigated areas in Clarendon and St. Thomas.

Experiments on Quarantine.—The experiments carried out on the Atlantic Fruit Company's properties in St. Mary under the supervision of Mr. Roy Johnson reached their third complete year at the end of August, 1931. These experiments covered a wide range of soils, rainfalls and other conditions. Unfortunately in most of the experiments there was an "interference factor" such as uneven flooding, replanting etc., which made it necessary to discard certain of the results as being unreliable for any purpose of generalization. In the main, however, the experiments showed that where no interference took place the nine-root system of treatment and quarantine maintained the maximum output for a greater length of time. In several instances, the one-root treatment while showing some apparent advantage in the first year produced a rapid spread of the disease after the first eighteen months, the disease spreading in geometrical progression from then onwards. It was particularly noticeable that the disease spread in a more centrifugal nature after the second year of the one-root treatment. Experience has shown that to the general planter the concession of permission to treat the diseased root only as a means of "Salvage" is interpreted to mean that no treatment should be carried out at all. In several instances in which this has been done, the results have been disastrous. The writer desires to place on record his sincere appreciation of the manner in which these experiments were carried out by Mr. Roy Johnson and his staff who maintained very careful and detailed supervision and records during the three years of this set of trials.

Killing Bananas with Chemicals.—The experiments reported in the report for 1930 have been continued with gratifying results. The heavy gas oils used in the previous experiments were first of all tried in larger field tests. The results were extremely satisfactory. The effect upon the toxicity of the soil to future crops after application of these oils was investigated and it was shown that the toxicity of the oil rapidly disappears. Bananas and other crops planted in places where the oil had been applied a few months previously have grown very satisfactorily, and showed no ill effects. The preliminary results of these experiments were published in the Journal of the Jamaica Agricultural Society and the full final results in "Tropical Agriculture."

As a result of these experiments the Advisory Committee on the Banana Industry advised the Government to legalize the use of *approved* oils in Panama Disease treatment, and this was effected by an amendment of the Panama Disease Order. Since that time the Department has taken the necessary steps to approve only oils which had been subjected to test and for the protection of planters have required suppliers of these oils to give a written guarantee that the specifications of such oils will be maintained.

Since July, the oil has been in general use by the Inspectors with most satisfactory results. As a general average the application needed to kill a root has proved to be 1.503 pints. By reduction in the amount of labour and time necessary in treating individual cases of the disease it has been possible for the Inspectors to keep well up to date in treatment of the disease, and while the total cost of treatment to the Government for the year has not been reduced in comparison with the previous year, the cost per case treated has shown a reduction.

Planters who treat their own cases of disease have also used the oil to great advantage. Apart from the advantage of being able to treat the disease as it occurred during the heavy rains and on wet heavy clays without disturbing the soil, the method has in many instances effected a considerable reduction in the cost of treatment. With the permission of the Hon. P. Lindo the following detailed comparative costs are given:—

BALLARDS VALLEY ESTATE, 1930-1931.

Old Method of Treatment by Digging ou and Burning.

			182 cases.			Cost per Case.
			Cost.			
Labour	..	£26	19	7		35.56d.
Fuel	..	22	15	0		30.00d.
Lime	..	4	11	0		6.00d.
Total 182 cases	..	54	5	7	Total	71.56d.

Average cost per case 5/11½d.

New Method of Treatment with Heavy Gas Oil.

			535 cases.			Cost per Case.
			Total Cost.			
Labour	..	£22	3	9		9.95d.
Gas Oil	..	20	18	0		9.26d.
Lime	..	13	6	0		6.00d.
Total 535 cases		56	7	9	Total	25.31d.

Average cost per case 2/1¾d.

It is as yet too early to give any opinion as to whether the oil treatment will have any effect upon the spread of the disease, but there is every hope that if the disease is treated on the appearance of the very earliest symptoms, so that the oil may kill the underground portion of the banana before the infection has penetrated the plant as high as soil level the spreading of infection might be expected to diminish. Unfortunately, however, treatment at such an early stage frequently presents many practical difficulties both to Planters and Inspectors. At the same time every effort should be made to overcome such difficulties if a determined effort is to be made to keep the disease within reasonable control.

Several alleged or suggested cures for Panama Disease have been put to trial at the Government Laboratory.

Other Minor Diseases.—The minor diseases of this crop, Bonnygate disease (*Sphaerostilbe Musarum*, Ashby), Black Spot (*Cercospora Musarum*, Ashby), Marasmius disease, and water soak occurred from time to time to a minor extent.

The "pin-head" black spot on banana fruit was again prominent in irrigated fruit during the Autumn, and a similar spotting was prominent in certain mountainous districts during the same time. There is still no satisfactory evidence to show that these forms of spotting are other than physiological disorders apparently associated with fluctuations in soil moisture and soil temperature.

On account of restriction in the facilities for travelling it was not possible to carry out a more detailed study of this trouble as was originally suggested.

SUGAR CANE.

Mosaic disease has retained roughly its same status as in the past few years. In a few instances, however, due to curtailing of expenditure on certain estates, the disease has become slightly more prominent.

Two new canes which were imported from Barbados rapidly succumbed to Mosaic disease after being released from quarantine.

Root Disease.—The depression in the Sugar Industry has in some instances been reflected in the restriction of cultivation resulting in some instances in heavy infections with root disease. Many planters are still not familiar with this disease and do not realize that it is the result of improper cultivation and drainage.

COCONUTS.

There has been a distinct improvement in the general condition of this crop during the past wet year. For a period of years in many of the districts less favourable to coconut growing, the succession of low rain-falls has brought about a steady increase of the leaf troubles with which are often associated the fungi-Pestalozzia and Diplodia. During the past summer this disease has steadily become less noticeable, though it is a trouble which is liable to re-appear in any future dry season.

Bud Rot, owing to the wet weather, has been slightly more prominent in the western parishes. This disease, however, has now been reduced to one of minor consequence.

Citrus.

The importance of the citrus crop tends to increase especially in areas where Panama Disease is taking its toll of the banana cultivations. There is a resulting increase of interest in the diseases of the crop and enquiries on this group of diseases is showing a steady annual increase.

Root Diseases.—Root Diseases and Gummosis of various types is common throughout the Island on many of the old trees especially those which were planted on lemon stocks. By degrees planters are learning the necessity of plant hygiene in citrus groves and there is a steady increase of treatment of the various gumming diseases by the more progressive planters.

Scab—(*Sporotrichum citri*, Butl. and Doid) continues to be common in sour orange nurseries. Spraying with Bordeaux mixture has given reasonably good control. The most important point in connection with control of this disease in nurseries has been shown to be the eradication of all old sour orange and lemon trees from the immediate neighbourhood of the nurseries. Where this is practicable it has been found that healthy seedlings can be grown without having to resort to spraying. Considerable difficulty is often experienced in districts of heavy rainfall as it is almost impossible to maintain any protection from sprays where the nurseries are subject to frequent heavy tropical showers.

Wither Tip has been fairly common in young plantations especially in trees where there is a lack of balance between the root stock and the scion. *Knot* (*Sphaeropsis tumefaciens*, Hedges) is still common on limes but as most of the limes in Jamaica are grown in pastures it is extremely unlikely that this disease will ever be dealt with satisfactorily.

Fruit Rots.—On account of the very wet season and the unusually heavy rains in the summer the storage rots of citrus have been most pronounced. This matter has been given very serious and constant attention during the latter part of the year. At the request of the Jamaica Citrus Producers' Association a large and comprehensive series of experiments has been carried out into the methods which might be used in Packing Houses to control these diseases. The results of these experiments have been most satisfactory and are about to be published elsewhere. The effect of the ethylene method of colouring fruit upon the incidence of Stem-End rots and *Pencilium* rots has been carefully investigated and while it has been shown that there is an increase in these diseases as a result of the ethylene process it is pleasing to report that it has been demonstrated that almost complete control of Stem-End rot may be effected in spite of this. In this connection I desire to record my appreciation of the services rendered by the Imperial Mycological Institute and Miss Hellinger in examining experimental shipments of fruit sent to the London markets.

COFFEE.

Damping off (*Rhizoctonia solani*, B. and G.) occurred again in the nurseries but was kept in control by the use of Cheshunt mixture. The American Leaf Disease (*Omphalia flavida*) was noticed occasionally in shady places in the Port Royal Mountains. This disease, however, is not very common and of minor importance. Occasional cases of Black Rot (*Rosellinia* spp.) occurred throughout the mountains in all parts of the Island. This disease is especially common in the mixed cultivations of the small settlers. The only satisfactory resistant crops which have been noticed are the sour orange and sugar cane. The fact that practically all other crops are susceptible tends to make this disease difficult of control. One case of Thread Blight (*Corticium Koloroga*) of moderate intensity was reported.

MAIZE.

A few occasional cases of Smut (*Ustilago Maydis*) were noted, and Rust (*Puccinia sorghi*) was fairly frequent.

TOBACCO.

Mosaic still continues to be a most serious disease of this crop, especially on the ratoons.

PINEAPPLE.

With the increase of interest in this crop especially on the Liguanea Plain there has been an increase in the number of enquiries concerning its diseases. Many isolated plants have died from a rotting of the plant at soil level. In several cases hyphæ of a Phycomycete were present, and it would appear that the disease is caused by *Phytophthora parasitica*. Small experiments have been made treating the soil with Cheshunt mixture before replanting, and using applications of the solution to the growing plant. These experiments are not complete.

GRAPES.

Anthraxnose (*Gloeosporium ampelophagum*) was noted in a few cases. On account of the wet season the Downy Mildew (*Plasmopara viticola*) was considerably more common than usual.

MANGO.

On account of the unusually damp weather and morning mists during the early part of the year a great deal of fruit was lost by the young flowers being attacked by the Mildew (*Oidium spp.*)

AVOCADO PEAR.

As usual a number of trees were lost in the mountainous districts through attacks of the Black Rot fungus (*Rosellinia spp.*) This crop is specially susceptible to Root diseases. One case of severe leaf infection with the citrus scab organism (*Sporotrichum citri*) was recorded.

PAW PAW.

The Mosaic disease of this crop continues to be almost the limiting factor in its cultivation on a large scale. It is particularly apparent on the irrigated portions of the Liguanea Plain. It seems probable that the virus of this disease has alternative hosts in many of the common weeds which frequently show Mosaic symptoms. On account of the lack of facilities it has not been possible to make any further investigations into the means of transmission of this disease. It has been found however, that a reasonable proportion of temporary recoveries may be obtained by cutting back diseased trees to soil level as soon as the first symptoms of infection appear. By this means a fairly high percentage of healthy secondary growths are produced, and in many cases these produce a fair number of mature fruits before re-infection takes place.

VEGETABLES.

Irish Potato.—Late Blight (*Phytophthora infestans*), on account of the wet season, was a little more prevalent than usual. Early Blight (*Macrosporium solani*) was also recorded, but neither disease was particularly serious. Tuber infection from Late Blight is almost unknown in Jamaica probably on account of the short growing season. Common Scab (*Actinomyces scabies*) was fairly common on the light soils. Several cases of infection by *Sclerotium Rolfsii* were recorded during the year.

Tomato.—Leaf Mould (*Cladosporium fulvum*) and Late Blight (*Phytophthora infestans*,) were both common. It was found that it required very frequent sprayings with Bordeaux mixture to render a reasonable control of blight. Even with the use of adhesives a Bordeaux spray is rapidly washed off with the heavy tropical showers. Mosaic was very common.

VEGETABLES IN GENERAL.

The Downy Mildews of the various vegetables and the smaller crops were more pronounced this year than usual. Root Knot (*Heterodera radiculicola*) was recorded on a number of hosts. This Eelworm disease is particularly common on the Liguanea Plain. Leaf Spot (*Cercospora capsici*) was recorded on Sweet Peppers.

RAISING ORCHIDS FROM SEED.

This line of research which has now been carried on for three or four years has reached the stage when the methods devised by the writer have become almost a routine. The full description of the method used, which is based on the use of pulped filter paper as a medium for growing the Orchids has been published elsewhere, and is not being repeated in this Report. Some sixty odd hybrids of various sorts have been grown successfully and several of these crosses are now making sturdy growth in the open air. Such relatively difficult subjects as Phalaenopsis, Renanthera and Epidendrum have been grown satisfactorily under this method; in fact Phalaenopsis seedlings only five months old have leaves $\frac{3}{4}$ in. long. Greater details of the varieties grown are given in the report of the Horticulturist.

INSPECTIONS.

Inspection of all seed potatoes imported by the Agricultural Society has been carried out as hitherto, and again it is a pleasure to record the high standard of health of the certified seed potatoes imported from Canada. With the exception of occasional cases of Common Scab these seed potatoes are quite clean and free from diseases.

On account of the wet weather in Great Britain during the past year, the seed potatoes imported from Scotland showed a very high proportion of wet rots following infection by Blight (*Phytophthora infestans*).

PUBLICATIONS, ETC.

Articles were published in the Journal of the Jamaica Agricultural Society on the following subjects:— Diseases of Grapes, Oil Treatment for Killing Bananas, Leaf Diseases of Potatoes, Stem-End Rot in Citrus; A report upon Panama Disease in Portland in the Jamaica Gazette.

A paper on Stem-End Rot of citrus embodying the results of recent experiments carried out, is in preparation, while papers have been published in "Tropical Agriculture" on Oil Treatment of Bananas, and in the Gardeners' Chronicle on a Modification of the Asymbiotic Method of Raising Orchid Seedlings. The paper prepared on the diseases of Jamaica crops has not yet been published. The Plant Disease Museum has been added to during the year and has been a source of interest to visitors to the Laboratory.

F. E. V. SMITH,
Government Microbiologist.
17th February, 1932.

Report of the Supervising Inspector of Plant Diseases on Banana Breeding for the year 1931.

Experiments in connection with Banana Breeding during the year 1931 have been carried out at Castle-ton Gardens, the St. Catherine District Prison Farm, Caymanas Estate and at the Government Laboratory at Hope.

CASTLETON GARDENS.

Acting on the suggestion of the Director of Agriculture to increase the acreage at this station I made a survey of the soils on the upper lands of the Gardens. Nearly two acres of fertile clayey loam suitable for banana growing were found above the Post Office. This area which was thickly wooded, was cleared, forked and trenched. It was planted on the 3rd and 4th of March. The plants as a result of early trenching grew rapidly and began fruiting within six months of planting. Up to the end of December, 1931, 9 months, one hundred and thirty-eight (138) bunches were pollinated and four (4) bunches reaped.

In November, 1931, a heavy norther visited both the upper and lower plots and destroyed 90 plants, the majority of which had been pollinated. Pollination of every finger was vigorously kept up throughout the year. About 200 seeds were taken from ripe bunches. All efforts in pollinating such varieties as "Ram Kela," "White House," "Rubra," "Honey" and "Apple" have been discontinued as the seedlings produced from cross fertilization of these varieties have proven very unsatisfactory.

Five distinct varieties of the "Gros Michel" have been found. The propagation and pollination of these are being keenly carried out. One variety found at Highgate, St. Mary, is a dwarf form producing large compact bunches. Over 100 plants of this variety are now growing. A cross from this sport of "Gros Michel" is expected to produce not only a Panama disease-immune but also a hurricane-resistant banana.

CAYMANAS.

Extensive tests in pollination have been carried out at this station; 558 bunches were worked on and notes were made of the different methods of pollination. Only 36 seeds, however, resulted and these were found in groups, pointing to the fact that weather conditions were an important factor in the production of seeds. A small glass shed has been erected at this station and all seeds from the various stations are sown in boxes; 38 plants have already grown from the seeds sown this year. The seedlings produced in 1930 have been up-rooted and replanted, as stronger and more perfect bunches are likely to be produced from the suckers than from the original seedlings. Three-fourths of the "Gros Michel" planted out on this plot have been destroyed and 400 suckers of "Gros Michel x Robusta" have been replanted. Experiments in manures by the newly appointed Agricultural Chemist have been started and everything is being done to force these plants to produce longer fingers.

The two Jamaica bananas planted in a diseased area below this plot have died from Panama Disease while the seedling simultaneously planted between them has already produced its second bunch.

ST. CATHERINE DISTRICT PRISON.

This Plot is now planted out with 300 suckers, crosses of the "Gros Michel-Robusta" varieties. A fairly good crop was reaped from this plot up to August when a severe norther damaged the field. A few plants improved and 'shot' nine hands. The fingers were greatly improved and many bunches would be taken on the market under normal conditions. The Plot has been replanted with large and healthy suckers of the same varieties and a proper test of the fruiting qualities is expected from such planting.

THE GOVERNMENT LABORATORY.

The Plot here is so highly infected with Panama Disease that no "Gros Michel" has ever kept healthy for a longer period than four months. This Plot has been replanted with immune seedling suckers. One gentleman planted two Gros Michel suckers and carried out some soapy treatment on them but these suckers died within three months of planting. All the seedlings previously planted still keep up their immunity.

Since the experiments in connection with Banana Breeding have started, over 120 different seedling varieties have been produced. In several cases the seedlings produced from the same "parents" differ amongst themselves in several important characteristics, each forming a new and distinct variety by itself. Certain seedling varieties have produced bare stalks without any fruit whatever, others large navels with few fingers, etc. The crosses which have been most successful and on which all efforts are now concentrated are the Gros Michel-Robusta and the crosses of these again crossed back to the Gros Michel. Over 300 suckers of the Gros Michel-Robusta cross have been distributed to planters throughout the island and their progress under varying climatic and soil conditions is being closely watched.

In conclusion I must thank the management of the Caymanas Estate and the Superintendent of the St. Catherine District Prison for their kind and helpful assistance given me in the cultivation of these Plots.

J. B. SUTHERLAND,

Supervising Inspector of Plant Diseases,

27th January, 1932.

Report of the Government Entomologist.

The constantly humid atmospheric conditions which have prevailed during the period under review appear to have been unfavourable to the development in epidemic proportions of those pests which generally cause the most serious depredations in the fields.

On the other hand those same humid atmospheric conditions and the longer periods during which certain agricultural products have been kept in storage have contributed to give more importance to those pests which destroy stored products.

In the following abridged review are only mentioned the most important or otherwise interesting insect pests dealt with during the year.

CITRUS.

Scale Insects.—With the extension of the Citrus Industry interest in the insects affecting grapefruit and oranges has considerably increased.

The presence of scale insects (Especially *Lepidosaphes beckii*, (Newm.) and *Aspidiotus aurantii*, (Mash.) on the rind of those fruits has caused a certain amount of difficulty to those engaged in the export of citrus fruits.

The various aspects of that problem were fully discussed with those concerned, and it was stressed upon them that the best remedy to that situation was in the destruction of the pests in the fields. The expenses thereby incurred would be largely recuperated by increases in quantity of the crops, rather than by the application of treatments aimed at rendering exportable fruits received from the fields heavily infested with scales.

It is satisfying to note that an increasing number of those planters who have regularly planted citrus groves now apply systematically methods of control against scale insects. If market conditions are favourable for the export trade, and if all fruits found heavily infested with scales are systematically rejected by those engaged in the export trade, the example of those progressive planters will be soon followed by their neighbours.

Fiddler Beetles.—Severe outbreaks of the Striped Fiddler Beetle (*Prepodes vittatus*, L.) and in smaller numbers of the Small Green Fiddler Beetle (*Pachnaeus litus*, (Germar.)) occurred in grapefruit and orange groves in Manchester. The Large Fiddler Beetle was also very destructive to young citrus trees in St. Andrew. By hand-collecting the adults and by burying as a deterrent a crude form of Paradichlorobenzene into the soil around the base of the plants, those pests were rapidly controlled.

Coccus Viridis G.—The Green Scale, *Coccus viridis*, G. was found attended by ants (*Cremastogaster brevispinosa*, Mayr., var. *minutior*, For., and *Solenopsis geminata*, F.) causing considerable damage to young citrus plants and also to older trees growing on poor soils. Simultaneously with the application of direct methods for controlling the scale insects, planters are being shown how to destroy the forerunners of the attending ants and how to grease band their trees.

COTTON.

The Pink Boll Worm of Cotton (*Pectinophora gossypiella*, Saunders) was found attacking cotton growing wild in the garden of an Hotel near Kingston. The plants were destroyed and no cotton plants are now allowed to grow in that locality which is not an agricultural one.

For reasons of economy and also because cotton is no more cultivated on a commercial scale in the Island it has not been possible for the Entomologist to conduct a systematic survey in connection with the distribution of that pest.

COFFEE.

The Green Scale Coccus Viridis G.—At low altitudes where coffee is grown under shade in sheltered and generally humid situations that pest was not found to cause serious damage being under such condition very effectively controlled by fungoid parasites, chiefly by the White fungus: *Cephalosporium lecanii*.

On the other hand at high altitudes where the reputed Blue Mountain Coffee is produced that pest is now causing considerable damage. There, on account of the climatic conditions, coffee is grown without shade trees and in situations most exposed to sun and unavoidably to winds. The bushes are also pruned to admit a maximum of sunlight. Under those environmental conditions *Coccus viridis* is not kept under control by the above-mentioned natural enemies and it is here found breeding in numbers all the year round. In the Blue Mountain regions spraying of the bushes to control the scales is practically impossible.

Whilst experimenting with various insecticides for the control of that pest, it was found that the cheapest and most effective method was fumigation with Hydrocyanic acid gas under covers arranged so as not to touch any part of the plants under treatment. This is now regularly carried out with excellent results at the Hope nurseries.

Coccus viridis being fostered and largely disseminated by ants, experiments were carried out with various grease banding materials and it was found that a preparation of rosin dissolved in a mixture of castor oil and linseed oil was sufficiently cheap and effective to allow of its use on the necessary large scale.

This mixture is prepared by dissolving rosin in boiling castor oil and raw linseed oil mixed in equal parts. Air is then blown through the hot solution until it cools to atmospheric temperature. It is then applied over bands of Celophane.

Host plants of the pest in localities where coffee is grown in small patches scattered amongst rank vegetation may prove an important factor in the control of the pest. It is therefore proposed to start systematic investigations in that connection.

TRUCK CROP AND GARDEN INSECTS.

The insects dealt with have been:—

Attacking Cabbage: *Pontia monuste* L. and *Plutella cruciferarum* Zeller.—The first mentioned pest breeds in large numbers on the very common though generally inconspicuous Cruciferous weed, *Cleome ciliata*.

Pumpkin and Cucumbers: *Margaronia hyalinata*. Linn.

Chocho: *Margaronia nitidalis*.

Peanuts: Larvae of *Ligyris tumulosus*, Burm.

Tomato: *Protoparce seseta jamaicensis* Yohan.

Chloridea obsoleta (Fab.)

Prodenia ornithogalli, Guen.

Nezara marginata.

Heterodera radiculicola.

Strawberries: *Gryllus assimilis* F. frequently caused serious injuries to strawberries and to many other garden plants.

Dahlias and Roses suffered especially during the summer months, from attacks of the Curculionid *Lachnopus aurifer* (Dru.)

Pine Apple: *Pseudococcus brevipes*, Chll. was often noticed infesting pineapple plants growing on clay soil of poor quality; the absence or scarcity of that pest on plants growing under favourable conditions on good loams was in many instances very noticeable.

Metamasius ritchei was noticed in the Above Rocks district.

INSECT AFFECTING SHADE AND ORNAMENTAL TREES.

The Stem Girdler, *Oncideres amputator*, F. was prevalent in St. Andrew on *Albizia lebbek*, and on Tropical Almond trees. *Terminalia catappa*. Serious outbreaks of the Coffee stem borer, *Apate teretans*, Pall. on Cachu trees and on *Acalypha* was controlled by introducing crystals of Paradichlorbenzene inside their galleries, the entrance to which were then subsequently filled with clay.

Poinciana: The damages periodically caused to those trees by *Lyncestis aconticides*, Guen. were minimised by grease banding the trees.

Parasites.

Argas Perisicus was found causing considerable damage to poultry on an estate of the Blue Mountain and specimens of the parasite was also received from Cross Keys.

Sarcophylla Penetrans infested a school in Clarendon and was also reported from New Castle.

PIMENTO.

The Pimento White Fly; *Aleurodicus pimientae*. As a result of complaints received from planters about damages caused in certain localities by the Pimento White Fly; *Aleurodicus pimientae*, investigations were made with regards to the distribution of the pest in the Island.

The question has formed the subject of a detailed report. It suffices here to note that the survey I made at the beginning of the year over a large area of those districts where pimento trees grow in abundance, tend to show that the pest does not exist or does not cause considerable damage in any other localities other than those situated in Manchester already reported by my predecessor as being infested in 1927.

The state of affairs in those infested regions which are situated along the slopes of a mountain exposed to strong winds prevailing all the year can be mainly ascribed to the extremely unfavourable environmental conditions under which the trees through inconsiderate deforestation are now growing. Those trees which now act as wind breaks over denuded pasture lands, where through erosion the soil is only a few inches deep, have a very low vitality. Those trees which owing to very uneven configuration of the soil are somewhat sheltered from the winds and grow in depressions where the soil is deeper, show, through growing amidst infested ones, a remarkable resistance towards the pest and *Aleurodicus pimientae*, was there found heavily paratized by the entomophagous fungus *Aschersonia allyrodis*.

All aspects of the question considered it was not thought advisable to recommend the adoption of the measures of quarantine or of compulsory treatment by artificial methods asked by certain planters. Whilst visiting the plantations the more rational aspects of the question was explained to those concerned and the situation was also reviewed in an article published in the Journal of the Agricultural Society. A second tour of inspections projected during the summer months with a view to studying the pest when climatic conditions would be greatly different to those prevailing when the survey was made, could not be undertaken owing to necessity for economies in travelling expenses.

The Tingidae: *Lepitostyla* sp.—A yet unrecorded Tingid: *Lepitostyla* sp. was found to be the cause of the leaf spots known as 'thrip rust' to pimento growers. The insect was found all over the regions visited causing in certain cases leaf spots which though inconspicuous must seriously impair the normal growth of infested plants.

COPRA.

Important stocks of Copra were seriously infected by insect pests, the species causing the greatest damage were *Silvanus surinamensis*, L. and *Necrobia rufipes*, De G.

The Pyralid, *Ephestia cautella*, Wlk. though found but in one of the warehouses inspected caused there appreciable damage, especially in bags stacked along a humid wall in a dark corner of the building. Experiments in the laboratory later showed that copra which had become mouldy was much more attractive to that pest than the product of better quality.

The other insects found infesting Copra were: *Tribolium castaneum* Host, *Cathartus advena*, Walth. and *Carpophilus dimidiatus*. They were less abundant than the two first mentioned pests.

From observations made in warehouses and factories and from the results of experiments conducted in the Laboratory it appears that low grade copra is more attractive to the above-mentioned pests than well cured copra from dry nuts.

There are good reasons to believe that the utilisation of those nuts which have been blown off the trees by the strong winds experienced during certain periods of this year has contributed to favour the incidence of the above-mentioned insect outbreaks.

The main factors which cause such infestations are however to be found in the defective conditions under which the product is generally stored in rural warehouses and factories, where often some parts if not the whole of the floor of the buildings are built of wooden boards in the interstices of which pieces of copra accumulate, and breed the insects which attack that product.

Whenever opportunity arose such facts were explained to those concerned. It is hoped that the example of those who have already remedied such a state of affairs by cementing the floors of their warehouses will be soon followed by others.

Whenever it was practicable, the insect infestations were controlled by fumigation with Hydrocyanic acid.

CACAO.

With a view of ascertaining the extent to which cacao beans become infested with insect pests a survey limited by lack of funds but sufficiently extensive to give a general idea of the situation was carried out in warehouses, in factories and in several shops in rural districts. It was found that cacao beans in Jamaica are rarely infested by insect pests and that this can be ascribed chiefly to the rapidity with which the product is handled and exported.

Only in two cases and in warehouses in Kingston was cacao found attacked by *Ephestia elutella*.

LITERATURE.

An illustrated Bulletin on Insect Pests affecting Tobacco in Jamaica and a Departmental Circular "Direction to Planters for sending Insect Specimens for identification," have been prepared and will be published when the financial situation will permit.

Various articles on Entomological problems were contributed to the Journal of the Jamaica Agricultural Society.

COLLECTIONS.

Additions were made to the Department Collections. I am indebted to the Imperial Institute of Entomology for the identification of the specimens submitted.

The Insects and other Arthropods in the exhibits of the Institute of Jamaica are being rearranged and systematically classified and labelled with a view of arousing the interest of the visiting public, and especially of the school children, in Natural History and in Entomological problems.

W. H. EDWARDS,
Government Entomologist.

VI—AGRICULTURAL EDUCATION.

Report of Headmaster Government Farm School.

I have the honour to forward my annual report for 1931.

Attendance.—The students in attendance during the year were as follows:—

Easter Term	..	55
Midsummer Term	..	55
Christmas Term	..	52

Third Year Class.—Twenty-three students were graduated at the end of the Christmas Term. The students receiving certificates for having successfully completed the course were:

A. V. Allen	C. G. Rankine
B. E. Black	R. B. Russell
M. M. Bygrave	A. L. Saams
S. S. Dale	L. W. Samuels
H. J. Gore	I. J. Stewart
C. Henry	I. V. Tomlinson
C. G. Kelly	H. J. Turner
V. G. Kelly	G. M. Vaughn
L. F. Llewellyn	B. M. Walker
S. H. C. Marsh	H. C. Walters
A. Mattocks	V. H. Welsh
R. S. Metz	

Grove Place.—A new policy whereby the Third Year Students spend half their time at the Government Farm at Grove Place, was inaugurated at the beginning of the Christmas Term. This affords an excellent opportunity for the students to learn practical methods of estate management, and is proving to be a valuable addition to the Third Year Course.

Field Husbandry.—Experiment Station. The students visited the Experiment Station for five days each week and received instruction in nursery work, cultivation of vegetables such as tomatoes, cabbage, potatoes, turnips, carrots, lettuce and cauliflowers. Instruction was also given in the proper method of cultivating such major crops as bananas, coffee, cacao, citrus and sugar cane, and such minor crops as pine apples, tobacco, cassava and peanuts. The students did practical work in eradicating weeds, pruning and mulching and the preparation and application of insecticides and fungicides.

Visits.—A number of visits were made by the Senior Students to places of interest in connection with their work at the School. Visits were made to the Silver Hill Coffee Factory, the Jamaica Citrus Producers' Packing House, the Doncaster Soap Factory, the Agricultural Society's Model Apiary, Caymanas Estates and several Small Settler's Holdings in St. Andrew and St. Catherine. These visits proved very beneficial to the students, especially so were the visits made to the estates and holdings, where crops growing under various soil and climatic conditions could be observed.

Stock Farm.—Students of all years received practical experience in livestock and machinery by working on the Stock Farm. This work greatly supplements the work given in the lectures.

Metal Work Shop.—The recent addition of a metal work shop now makes it possible to give the students a course in metal work, such as blacksmithing, pipe fitting, and making general repairs on the Farm. This course is proving to be a valuable addition to the curriculum.

Curriculum.—A new prospectus was printed and courses in Live Stock Judging, Metal Work and Estate Management were added.

Sports.—The School completed a very successful year in both cricket and football. An active part was taken by all students in these sports and a number of matches were played against teams from Kingston.

Student Christian Movement.—The Farm School Branch of the Student Christian Movement had a successful year. Appreciation is due to Mr. Hallett for the interest he has taken in this branch of the Students' activities.

I wish to express my appreciation of the excellent co-operation I have received from the Staff.

I have the honour to be,

Sir,

Your obedient Servant,

J. H. HOWE,
Headmaster.

Report of Medical Officer.

I have the honour to report that the general health of the Students at the Farm School for the year ending 31st December, 1931, has been good. One student had a mild attack of measles; he was isolated and treated. All new students and the Domestic Staff were inoculated against Typhoid during the year.

I have the honour to be,

Sir,

Your obedient Servant,

G. P. CAMPBELL,
Medical Officer, Farm School.

The Director of Agriculture,
Hope, Kingston P.O.

VII.—LIVE STOCK.

GOVERNMENT STUD FARM, GROVE PLACE, MANCHESTER.

Live Stock, Grove Place, 1931—

- 1 Imported Jersey Bull
- 2 Native Pedigree Jersey Bulls
- 1 Pedigree Ayrshire Bull
- 2 Grade Montgomery Bulls
- 8—2 Grade Bull Calves of 1931
- 6—6 Pedigree Cows and Heifers
- 56—56 Native Cows
- 1 Grade Native Heifer
- 2 Grade Ayrshire Heifers
- 14 Grade Brown Swiss Heifers
- 19 Grade Guernsey Heifers
- 24 Grade Jersey Heifers
- 63—3 Grade Red Poll Heifers
- 3—3 Steers

Horsekind—

1 Imported English Thoroughbred Stallion, "Royal Highness"
1 Imported Proof Ass "Kentucky Boy"
8 Brood Mares
4 Fillies
2 Colts
1 Gelding
12 Mules
5 Donkeys
—
34 Head
—

The following is the summary of the valuation of Livestock at Grove Place on 31st March, 1931:—

Cattle	£1,048	0	0
Horsekind	798	15	0
Total	£1,846	15	0

Services of Bulls at Grove Place 1st January to 31st December, 1931.

No.	Bulls.	Visiting Cows.	Farm Cows.	Total.
1 Jersey Bull "Glen"	..	6	16	22
2 Jersey Bull "Etta's Pogis"	..	10	9	19
3 Jersey Bull "Glen's Prefect"	..	2	6	8
4. Montgomery Guernsey "Cortes"	..	13	6	19
5. Montgomery Brown Swiss "Justice"	..	14	9	23
6. Ayrshire "Food Controller"	..	1	3	4
		46	49	95

GOVERNMENT STOCK FARM, HOPE.

*Live Stock, Hope Stock Farm, 1931.**Pedigree Stock:*

Red Polls—

Imported Red Poll Bull	1	
Native Red Poll Bull Calves	4	
Native Red Poll Cows and Heifers	36	41

Jerseys—

Imported Jersey Bull	1	
Native Jersey Bulls	2	
Imported Jersey Cow	1	
Native Jersey Cows and Heifers	28	32

Guernseys—

Imported Guernsey Bull	1	
Native Guernsey Bull Calves	3	
Native Guernsey Cows and Heifers	5	9

Brown Swiss—

Native Brown Swiss Cows and Heifer	6	6
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Montgomery—

Imported Montgomery Bull	1	1
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Holstein-Friesian—

Imported Holstein-Friesian Bull	1	1
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Total Pedigree Stock	90	90
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Graded Stock:

Bulls—

Grade Montgomery Bulls & Bull Calves	11	
Grade Guernsey Bull Calves	4	
Grade Jersey Bull Calf	1	16

Cows—

Dairy Cows	120	
Foster Mothers	12	132

Heifers—

Grade Native Heifer	..	1	
Grade Brown Swiss Heifers	..	11	
Grade Guernsey Heifers	..	36	
Grade Holstein Heifers	..	12	
Grade Jersey Heifers	..	35	
Grade Montgomery Heifers	..	11	
Grade Red Poll Heifers	..	5	111

Steers—

Plough Steers	..	12	12
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Total Graded Stock	..	271	271
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Grand Total	..	361	
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Horsekind: 20 20 Mules

Poultry—1 Pen Rhode Island Reds.

Bees—Nil.

Weekly Analysis of Milk supplied to the Public Hospital, Lunatic Asylum and General Penitentiary by the Hope Stock Farm, 1931.

Quarter ending		Solids.	Fat.	Sp. Gravity.	Solids Not Fat.
March 31, 1931	..	13.77	5.14	1.0298	8.63
June 30, 1931	..	13.83	5.13	1.0301	8.70
September 30, 1931	..	14.24	5.64	1.0293	8.60
December 31, 1931	..	14.08	5.31	1.0302	8.76
		13.98	5.31	1.0299	8.67

The following is a summary of the valuation of the Live Stock at the Hope Farm to 31st March, 1931:

Cattle	..	£7,977	0	0
Horsekind		328	0	0
Poultry		90	0	0
		£8,395	0	0

Milk Yield, Dairy Herd, 1927, 1928, 1929, 1930, 1931.
Imperial Quarts per diem.

Month.	1927	1928	1929	1930	1931
January	433.7	400.1	490.0	456.6	518.9
February	392.0	363.1	459.0	519.5	548.0
March	407.4	401.6	454.8	491.5	557.0
April	459.2	478.3	464.0	600.4	603.8
May	503.1	520.6	466.9	627.9	606.2
June	444.4	533.0	499.9	600.2	626.9
July	476.1	564.1	527.8	595.0	601.9
August	489.4	557.5	562.5	556.4	576.3
September	456.2	524.7	538.3	568.1	534.4
October	396.9	463.0	480.7	583.8	538.6
November	424.6	445.7	471.1	593.4	555.3
December	429.7	455.4	474.0	545.3	554.3
	442.7	474.7	490.8	561.5	568.5

Record of Dairy Herd Milk Yield, 1931.

Month.	Av. No. of Cows.	Total Qts. per mensem.	Av. per Cow-Qts.
January	96	16086.2	5.4
February	99	15344.5	5.5
March	95	17266.3	5.9
April	97	18112.5	6.2
May	98	18793.8	6.2
June	104	18806.2	6.0
July	103	18657.6	5.8
August	104	17865.7	5.5
September	104	16031.9	5.1
October	107	16693.8	5.0
November	110	16659.1	5.0
December	106	17184.8	5.2
	102	17291.9	5.6

MILK YIELD, 1931.

No.	Name of Cow.	Breed.	Age in years.	Average Content Milk Fat.	Yield in lbs.	Milking Weight.	Max. Yield Imp. Qts.	Sale Price at 8d. per qrt. to 31.3.31 and 7d. per qt. thereafter.
								£ s. d.
1	Norbrook 4th	Grade Jersey	6	5.9	7,918	1,070	17.4	90 17 10
2	Marchioness 12th	Grade Montgomery	9	5.9	7,899	1,166	17.5	93 8 2
3	Hope Beta 5th	Red Poll	9	5.2	7,515	1,100	18.8	88 7 2
4	Lydite 3rd	Grade Holstein	9	4.7	7,425	1,090	17.4	87 7 0
5	Lydite 4th	Grade Holstein	8	3.9	7,211	1,166	16.7	84 13 7
6	Norbrook 5th	Grade Jersey	4	6.1	6,679	920	18.5	75 16 9
7	Rosa	Grade Guernsey	5	5.0	6,331	900	16.0	74 10 6
8	Desiree 3rd	Red Poll	10	4.3	6,322	1,140	14.6	75 0 2
9	Cognac 2nd	Grade Holstein	9	4.9	6,272	1,110	15.6	73 19 9
10	Norbrook 3rd	Grade Holstein	7	4.6	6,246	1,160	16.3	72 3 7
11	Lydite 13th	Grade Holstein	9	4.3	6,180	1,100	15.6	74 3 9
12	Pigeon 2nd	Grade Brown Swiss	10	5.3	6,155	1,010	15.4	71 13 5
13	T. N. T.	Grade Guernsey	5	4.9	6,120	866	19.6	70 0 4
14	Hope Brisk 1st	Red Poll	12	3.9	5,927	1,190	12.3	70 11 3
15	Fifine	Grade Jersey	5	5.0	5,879	920	12.0	68 12 7
16	Monica 16th	Grade Guernsey	5	4.4	5,873	920	19.8	68 6 11
17	Sola 5th	Grade Zebu-Jersey	12	5.3	5,780	1,214	16.1	66 11 11
18	Bess 2nd	Grade Montgomery	7	5.0	5,736	1,114	17.3	64 18 8
19	Perfect	Jersey	8	5.6	5,551	900	17.0	64 10 3
20	Pogistine	Jersey	8	5.2	5,527	776	17.2	65 0 8
21	Susy	Grade Montgomery	6	5.3	5,526	1,020	14.5	64 16 3
22	Baby 2nd	Grade Montgomery	8	6.0	5,504	1,028	14.7	62 10 11
23	Angela	Jersey	6	5.7	5,386	872	16.9	62 13 0
24	Mystery	Grade Jersey	10	4.8	5,261	946	14.0	62 1 6
25	Sayda	Jersey	8	5.4	5,255	792	19.9	61 16 2
26	May 4th	Grade Jersey	9	5.0	5,208	966	15.5	59 13 4
27	Diva 10th	Grade Guernsey	7	5.5	5,108	1,020	17.5	59 6 4
28	May 3rd	Grade Guernsey	10	4.5	4,998	1,210	16.2	57 9 6
29	Blossom 1st	Grade Zebu-Jersey	13	4.1	4,987	980	15.7	58 10 3
30	Beetroot	Holstein Red Poll	12	4.1	4,940	990	13.8	58 18 6
31	Monica 15th	Grade Guernsey	6	4.6	4,875	900	14.9	55 19 4
32	Bess 1st	Grade Guernsey	11	5.1	4,869	1,040	16.3	55 4 10
33	May Fly	Grade Guernsey	6	6.2	4,857	865	15.4	55 9 5
34	Hood's Mead	Jersey	7	5.9	4,826	1,000	14.2	57 6 10
35	Rosette 10th	Grade Montgomery	6	5.3	4,826	910	15.1	55 18 4
36	Panama's Betty	Red Poll	9	4.4	4,819	1,090	17.9	54 5 0
37	Baba	Grade Native	4	4.9	4,805	830	11.8	55 19 11
38	Jo	Grade Montgomery	5	5.8	4,782	1,100	13.5	56 9 1
39	Rosette 9th	Grade Guernsey	6	5.6	4,756	920	13.4	55 11 5
40	Fantom	Grade Guernsey	4	6.1	4,755	900	9.6	55 19 4
41	Truth 4th	Grade Jersey	9	5.0	4,746	1,090	13.4	55 14 2
42	Ethelstine 2nd	Jersey	9	6.1	4,730	890	12.7	55 12 9
43	Lizzie 3rd	Grade Jersey	8	6.1	4,717	938	16.3	55 18 9
44	Pobess 3rd	Grade Guernsey	5	5.5	4,706	870	13.3	55 2 6
45	Hope Beta 3rd	Red Poll	11	4.3	4,557	1,014	11.1	52 8 2
46	Poltava (1st Calf)	Red Poll	4	4.9	4,555	1,160	20.1	51 5 10
47	Laurel	Grade Guernsey	3	5.1	4,544	1,200	13.5	52 8 11
48	Alicia	Grade Jersey	7	5.4	4,506	940	9.1	51 3 10
49	Hope Betty 5th	Red Poll	7	5.4	4,505	942	16.3	53 9 9
50	Aeroplane (1st calf)	Red Poll	4	5.4	4,437	1,114	19.4	49 19 1
51	Portia	Jersey	9	3.7	4,428	870	19.8	51 18 3
52	Pussy 2nd	Grade Red Poll	8	4.7	4,371	1,070	8.3	51 13 6
53	Vickie C.	Grade Montgomery	8	5.9	4,346	1,100	14.7	50 1 10
54	Meadow	Grade Montgomery	8	6.6	4,263	1,080	14.7	48 15 4
55	Musa	Grade Montgomery	4	6.0	4,239	1,050	10.6	49 12 0
56	Porosa 2nd	Grade Red Poll	10	4.2	4,223	1,128	13.0	50 18 4
57	Conora	Grade Guernsey	4	4.2	4,203	984	13.0	47 15 7
58	Veracity	Grade Guernsey	6	7.0	4,197	1,030	11.4	47 17 2
59	Teddy's Pretty	Red Poll	4	4.3	4,180	902	12.6	49 6 0
60	Diva 15th	Grade Guernsey	6	5.1	4,143	906	12.4	48 3 3
61	Polka	Red Poll	10	4.6	4,122	984	16.9	49 1 10
62	Tilda 9th	Grade Jersey	6	5.1	4,095	1,010	14.2	49 0 7
63	Angel 11th	Grade Holstein	9	6.0	4,032	1,218	16.2	47 10 10
64	Pergola	Jersey	3	5.4	4,006	730	6.6	47 3 10

PAYMENTS.

H. H. Cousins, Director of Agriculture.

W. E. WATSON, for Accountant.

HOPE STOCK FARM YEAR 1930-31 ENDED 31.3.31.

BALANCE SHEET.

	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.		
<i>Assets.</i>								<i>Liabilities—</i>							
Buildings—							Accounts Payable—								
As at 31.3.30	2,708	16	2				Treasurer for Canadian								
Additions ..	380	8	9				Agents ..	17	9	2					
	3,089	4	11				Fernando Castro	1	3	8	18	12	10		
Depreciation	87	4	10	3,002	0	1	Ja. Govt. Balance of grant								
							for purchaing Live Stock	1,272	0	3					
Machinery—							Less paid off by supplying								
As at 31.3.30	741	4	1				one bull to Stud Farm								
Additions ..	1,034	15	5				in Manchester during								
	1,775	19	6				year	30	0	0	1,242	0	3		
Depreciation	80	13	0	1,695	6	6	Profit and Loss—								
							As at 31.3.30	14,174	11	2½					
Furniture & Fixtures—							Add profit for the year	1,658	7	11	15,832	19	1½		
As at 31.3.30	988	12	10												
Additions ..	103	4	5												
	1,091	17	3												
Depreciation	50	0	8	1,041	16	7									
Truck—															
As at 31.3.30	180	0	0												
Depreciation	30	0	0	150	0	0									
Tools & Implements—															
As at 31.3.30	107	16	6												
Additions ..	297	5	8												
	405	2	2												
Depreciation	35	8	0	369	14	2									
Vehicles & Harness—															
As at 31.3.30	339	1	6												
Additions ..	101	6	2												
	440	7	8												
Depreciation	30	14	0	409	13	8									
Stores & Parts (Stock as per Inventory)				281	3	0									
Food for Stock (Stock as per Inventory)				665	11	4									
Plantation (3 acres pines)				80	0	0									
Live Stock (as per certified valuation)				8,395	0	0									
Accounts Receivable—															
E. Downes	1	4	1												
Public Hospital	48	11	8												
Jubilee Hospital	1	17	0												
Lunatic Asylum	67	6	8												
General Penitentiary	6	10	0												
Dr. J. Myers	0	10	4												
Farm School	2	7	2												
L. A. Powell	0	1	11	128	8	10									
Cash—															
In Bank (N.S.)	874	4	6												
In hand ..	0	13	6½	874	18	0½									
				17,093	12	2½					17,093	12	2½		

W. E. WATSON,
for Accountant.H. H. COUSINS,
Director of Agriculture.

HOPE STOCK FARM YEAR 1930-31 ENDED 31.3.31.

PROFIT AND LOSS ACCOUNT.

	£	s.	d.	£	s.	d.		£	s.	d.
To Depreciation—							By Livestock	766	17	7
Buildings	87	4	10				Milk	5,503	7	1
Machinery	80	13	0				Butter	291	3	1
Furniture & Fixtures	50	0	8				Rents	83	15	8
Truck	30	0	0				Bombay Mangoes	217	4	3½
Tools & Implements	35	8	0				Interest (Bank)	30	18	11
Vehicles & Harness	30	14	0	314	0	6	Miscellaneous	38	8	9
Repairs & Upkeep—										
Buildings	41	10	6							
Machinery	108	18	3							
Furniture & Fixtures	20	13	4							
Truck (including running expenses)	124	5	10							
Tools & Implements	37	5	0							
Vehicles & Harness	63	16	10							
General Repairs	362	12	8	759	2	5				
Food for Stock (consumed)				1,769	4	2				
Plantation (pines)	..			3	10	0½				
Miscellaneous Expenses	..			261	10	10				
Wages	..			1,026	19	9				
Growing Bombay Mangoes	..			25	19	3				
Cleaning & Fencing	..			587	18	6				
Taxes	..			10	12	0				
Accountant	..			125	0	0				
Clerk	..			80	0	0				
Foreman	..			115	0	0				
Rearing Calves at Grove Place	..			194	10	0				
Balance (net profit for the year)				1,658	7	11				
				£6,931	15	4½		£6,931	15	4½

W. E. WATSON,
for Accountant.
H. H. COUSINS,
Director of Agriculture

VIII.—GOVERNMENT LABORATORY.

Report of the Deputy Island Chemist.

The total number of samples analysed during the year ended 31st December, 1931, was 2,573 and compares with the two former years as under:—

1929.	1930.	1931.
2,549	2,665	2,573

The samples are classified as follows:—

"A" OFFICIAL SAMPLES.

(1) <i>Police</i> —			
Human Viscera and organs	..	..	104
Stomach contents and vomits	..	..	10
Animal Viscera	..	..	1
Urines	..	..	2
Substances for Poison	..	..	135
Coins, genuine	..	..	54
Coins, counterfeit	..	..	48
Currency Notes, genuine	..	..	2
Currency Notes, counterfeit	..	..	2
Counterfeiting Exhibits	..	..	137
Documents	..	..	1
Arson Exhibits	..	..	4
Obeah Exhibits	..	..	17
Jewellery (ring)	..	..	1
Insecticides (oxigenol)	..	..	1
Exhibits in murder cases—			
Firearms	..	..	3
Wads	..	..	2
Cartridges	..	..	4
Shells	..	..	3
Bullets	..	..	1

<i>Under the Spirit Licence and Rum Duty Laws.</i>			
Rums and Rum Punches	..	..	4
Bay Rums	..	..	2
Port Wines	..	..	1
<i>Under the Adulteration of Food and Drugs Law.</i>			
Whisky	..	..	1
Butter	..	..	1
<i>Under the Dangerous Drugs Law.</i>			
Opiums	..	..	18
Opium Exhibits, pipes, etc.	..	..	103
Ganga	..	..	188
Ganga Exhibits, pipes, rags, etc.	..	..	23
<i>Under the Drugs and Poisons Law.</i>			
Patent Medicines	..	..	8
<i>Under the Medical Laws.</i>			
Medicines and Drugs	..	..	44
Total			925
(II) Customs and Excise—			
Absolute Alcohols and Rectified Spirits	..	..	12
Denatured Alcohols	..	..	8
Native and other wines	..	..	35
Bay Rums	..	..	15
Spirits, Rum Punches, etc.	..	..	8
Fuel Oils	..	..	41
Gasolines and road oils	..	..	4
Disinfectants and Insecticides	..	..	12
Flavouring Extracts and Essences	..	..	11
Condensed Milks and Creams	..	..	6
Sugars	..	..	4
Drugs and Chemicals	..	..	3
Papers	..	..	3
Miscellaneous	..	..	6
Total			168
(III) Department of Science and Agriculture—			
Animal Viscera	..	..	9
Feeding Stuffs	..	..	9
Waters	..	..	3
Fuel oils	..	..	2
Citrus Washing Powders	..	..	2
Miscellaneous, Manures, Soft Soap, etc.	..	..	6
Total			31
(IV) Island Medical Department—			
Waters	..	..	16
Wood Preservative	..	..	1
Total			17
(V) Medical Officers of Health—			
Kingston:			
Fresh Herrings	..	..	13
St. Andrew:			
Fresh Milks, Genuine	..	..	13
Fresh Milks, Adulterated	..	..	1
Chocolate	..	..	1
Spanish Town:			
Coffee	..	..	1
Santa Cruz—			
Corned Fish	..	..	1
Total			30
(VI) Department of Public Works—			
Feeding Stuffs	..	..	3
Waters	..	..	2
Disinfectants	..	..	1
Minerals	..	..	1
Total			7

(VII) Sugar Industry Aid Board—

Sugars	..	..	...	..	19
Total					19

(VIII) Kingston and St. Andrew Corporation—

Waters	..	..	..	..	12
Sewage	..	..	..	..	2
Asphaltic materials	..	..	..	..	2
Special Preparations	..	..	..	..	1
Total					17
Total Official					1,214

"B" AGRICULTURAL.

Soils and Sub-soils	..	..	..	..	12
Bat Guanos	..	..	..	..	26
Artificial Manures and Fertilizers	..	..	..	..	19
Limestones	..	..	..	..	1
Molasses and Cane Juices	..	..	..	..	21
Total					79

"C" GENERAL.

Stock Farm Milks	..	..	..	..	871
Cattle Dips	..	..	..	..	80
Sugars	..	..	..	..	149
Rums	..	..	..	..	56
Fresh Milks and Creams	..	..	..	..	16
Waters, potable	..	..	..	..	9
Waters, other	..	..	..	..	7
Steam Coals	..	..	..	..	6
Minerals and Ores	..	..	..	..	16
Spirits, Alcohols, Bay Rums, etc.	..	..	..	..	3
Drugs and Medicines	..	..	..	..	4
Soaps	..	..	..	..	5
Oranges	..	..	..	..	6
Fruit Juices	..	..	..	..	4
Essential Oils	..	..	..	..	4
Mineral and other Oils	..	..	..	..	3
Breads	..	..	..	..	4
Copras	..	..	..	..	5
Substances for Poison	..	..	..	..	5
Specimens of Horse Saliva for Dope	..	..	..	..	6
Flavouring Essences and Jellies	..	..	..	..	7
Miscellaneous	..	..	..	..	14
Total					1,280
Grand Total					2,573

The 104 analyses of human viscera and organs, and 10 of stomach contents, were made in connection with 46 deaths. In 27 cases poison was found and determined in the viscera as follows:—

- (1) Traces of vegetable alkaloids resembling Urechitoxin (nightshade) in the viscera of male and female adults.
- (2) Large traces of Antimony in the liver of a male adult.
- (3) Traces of Chloroform from the stomach of an adult male suicide.
- (4) 1.35 grains Mercury from the viscera of a female adult.
- (5) 1.1 grain Mercury (Red Precipitate) from the organs of a female child.
- (6) Large traces of Oil of Chenopodium from the viscera of a male child.
- (7) 9.25 grains Novocaine from the organs of a male adult.
- (8) Traces of Hydrocyanic Acid from the viscera of male and female children.
- (9) Traces of Hydrocyanic Acid from the viscera of a female child.
- (10) 0.0075 grains of Antimony from the organs of a male adult.
- (11) 1.13 grains Arsenite of Soda from the organs of a male adult.
- (12) Arsenic and Phenols (Cooper's Dip) from the viscera of a male adult (suicide).
- (13) Arsenic and Phenols (Cooper's Dip) from the viscera of a male adult.
- (14) 0.011 grains Arsenic in the organs of a male adult.
- (15) Traces of Urechitoxin in the viscera of a male child.
- (16) Traces of Urechitoxin in the viscera of a child (female).
- (17) Traces of Urechitoxin in the viscera of a child (female).
- (18) Traces of Coniine from the organs of a female adult.

- (19) Traces of Solanine from the organs of a female adult.
- (20) Traces of Alcohol from the viscera of a male adult.
- (21) Cresols (Lysol) from the organs of a female adult suicide.
- (22) Traces of Hydrocyanic Acid from the organs of a male child (Cassava poisoning).
- (23) Cresols (Jeyes' Fluid) from the viscera of a male adult.
- (24) 0.0077 grains Arsenic from the organs of a female adult.
- (25) Traces of Ptomaines from the viscera of a female child.
- (26) Do. do. do. do.
- (27) Do. do. do. do.

The substances examined for poison which gave positive results were as follows:—

- (1) Urechitoxin in cooked food which had caused two deaths.
- (2) 3 grains Arsenic in Sweet Potatoes.
- (3) Mercury in a sample of "wet" Sugar.
- (4) Chloroform in a phial used by a suicide.
- (5) 0.5 grams of Arsenic in cut coconut.
- (6) Calomel in a powder suspected of causing poisoning.
- (7) Crude Nitrate of Potash sold as Glauber Salts.
- (8) Cooper's Dip in a phial used by a male suicide.
- (9) Lysol in a phial used by an attempted suicide.
- (10) 5.9 grains powdered glass in cooked food.
- (11) Morphine, etc. (ex Chlorodyne) in a vial used by an attempted suicide.
- (12) Commercial Hydrochloric Acid in a vial used by an attempted suicide.
- (13) Arsenic in coconut oil suspected of causing death.
- (14) Zinc Sulphate in a powder attempted to be sold as cocaine.
- (15) Mercury in grey powders attempted to be sold as cocaine.
- (16) Phenacetin in a powder attempted to be sold as cocaine.
- (17) Cresols (Lysol) from stomach washings of an adult female suicide.
- (18) Lysol in a vial used by female suicide.
- (19) Lysol in a glass used by female suicide.
- (20) 2 grains powdered glass in coffee.
- (21) 15 grains powdered glass in coffee.
- (22) Copper Sulphate in coconut oil used in attempted poisoning.
- (23) Copper Sulphate in cooked fish used in attempting poisoning.
- (24) Jeyes' Fluid in a vial used by an adult male suicide.
- (25) 5 grains powdered glass in coffee.
- (26) 5 grains Arsenic in coffee.
- (27) 86 grains Arsenite of Soda in salt used in attempted poisoning.
- (28) Carbolic acid in liquids (3) used in attempted poisoning.

During the year 270 certificates were issued to the Police Department, which is an increase of 56 more than the number for the previous year.

The number of human viscera and organs submitted was 104, being an increase of 14.

Substances submitted for test for the presence of poisons numbered 135 samples, which is an increase of 47 more than last year. Poison was found in 28 cases, which are detailed above.

Out of 102 coins submitted for test 54 were genuine and 48 were counterfeit, being composed of various alloys in which tin was the chief constituent.

The 137 Counterfeiting exhibits comprised various moulds and implements for the manufacture of base coins. The silver-plating of counterfeit coins is now much more common than hitherto.

A document which purported to be a receipt issued in 1926 was examined with a view to ascertaining the approximate age of the ink, and it was established that the document had been prepared only a few days before it was submitted for test.

Included in the four Arson exhibits was a quantity of pieces of partially burnt wood which were taken from the scene of a fire at a shop. The wood was found to have been originally painted with a zinc-white paint, and this was found to correspond with other pieces of painted wood taken from the yard of the suspected incendiary. Not only was the paint the same, but pieces of wood taken from the scene of the fire were found to match with pieces taken from the yard of the suspect, thereby showing that they had been cut from the same post.

17 Obeah exhibits were examined. These included such things as poisonous extracts of Urechites Suberecta (Nightshade) in Rum, Curare, Ganga, and other poisonous and harmful substances.

A substance which was being sold as an Insecticide was found to be nothing more than Plaster of Paris made into blocks with water. It possessed no insecticidal properties.

Two revolvers and one shotgun were examined with a view to ascertaining the time of last firing. A large number of experiments were also carried out with various firearms in order to collect data for determination of time of firing, and also for establishing identity between bullets and the firearms from which they were fired.

Only seven samples were received under the Spirit License Law as compared with 24 for last year. Of two samples of Bay Rum one had been adulterated by dilution with water.

Opium and opium exhibits show a great increase over last year, being 15 more samples of opium (chiefly raw opium) and 101 opium pipes and utensils for the preparation and smoking of opium.

Eight patent medicines were submitted under the Drugs and Poisons Law for the purpose of ascertaining whether the total contents of a full bottle, if taken in one dose, would be liable to cause the death of a person. None of the specimens examined were capable of causing any serious effects if taken internally.

Under the Medical Law 44 samples were analysed, and in most cases successful prosecutions were secured by the Police. The medicines comprised decoctions of herbs, salines, salts of iron and copper and various preparations of quinine with other substances.

For the Customs Department 168 samples were analysed, being an increase of 5 samples more than in 1930. The Customs samples are chiefly alcoholic, either for assessment of duty or for drawback on exportation. Other Customs samples were submitted for identification and classification in respect of the Tariff Law.

A total of 31 samples were analysed for the Department of Science and Agriculture. Nine animal viscera were examined for poison, and either Arsenic or Urechites was detected in the stomach contents.

In cases where stock are poisoned by eating the poisonous plant Urechites Suberecta, commonly known as "Nightshade," it appears that the plants had been cut down together with grass and dried and the dry fodder fed to the stock.

Two citrus washing powders were found to consist of Soda Ash and crude sodium phosphate respectively, with the addition of small amounts of inert colouring matter.

Two fuel oils were examined in connection with experiments on the use of oils in treatment of Panama disease of bananas.

Seventeen samples were submitted by the Island Medical Office, which comprised 16 waters and one sample of wood preservative. The latter was submitted on account of it causing dermatitis, and this was found to be due to Arsenic in the preparation.

Thirty samples of food-stuffs were submitted by Medical Officers of Health. The adulteration of milk has shown a considerable decrease as compared with former years, probably on account of the penalties which were inflicted on offenders last year.

Other public departments also submitted various samples during the year, but these call for no special comment.

AGRICULTURAL.

Seventy-nine samples were submitted under this head, being 11 more than last year. These samples were chiefly fertilisers, soils, and sugar cane products which were submitted in connection with manurial experiments.

GENERAL.

Under this head 1,280 samples were analysed, which is 93 less than last year.

Stock Farm milks numbered 871, being 10 less than the previous year. The number of Cattle Dips remains about the same.

Sugars showed an increase of 22 samples, whilst rums were 93 less than last year. As fees are payable for the analyses of samples submitted under this heading, with the exception of Stock Farm Milks and Cattle Dips, the falling off in the number of rum samples chiefly accounts for the reduction in the amount collected for Laboratory fees during the year.

The variety of other samples submitted is shown in the detailed table given above.

A series of experiments was carried out to ascertain if it was practicable to prepare coconut cream and preserve it in such a way that it would keep good without separation of the emulsion. The results obtained were such as to indicate that it would be waste of time and money for anyone to manufacture coconut cream on a large scale, as not only does putrefaction set in, even after pasteurising on three successive days, but the emulsion breaks down.

During the year the manufacture and sale of Paranaph and Fly Killer was continued as usual. As a result of the experiments made on the manufacture of suitable insecticides, to replace expensive imported insecticides for use in Public Institutions, it is satisfactory to record that the purchase of expensive spraying insecticides by the Mental Hospital has now ceased, and instead a cheap and efficient preparation is made according to the formula devised by the Deputy Island Chemist, thereby saving 12/3 on every gallon of spray used.

The following table shows the nature and amounts of materials issued to the public for the past three years.

	1929	1930	1931
Paranaph ..	37,849	33,512	36,770 lbs.
Arsenite of Soda ..	21,725	20,175	25,499 lbs.
Copper Sulphate ..	275	70	160 lbs.
Carbon bisulphide ..	493	516	669 lbs.
Rat poison, bulk ..	265	162	175 lbs.
Rat poison, 1 oz. pks.	nil	65	169 pkts.
Standard Iodine ..	47,750	41,750	39,000 ccs.
Thymol powders ..	330	466	199 ozs.
Starch solution ..	237	211	221 bottles
Soda bicarbonate ..	58	48	52 bottles
Cyanogas ..	nil	76	170 lbs.
Fly Killer ..	nil	194	53 gallons

The receipts for Laboratory Fees and Sales for the past three years are as follows:

	1929	1930	1931
Sales ..	£937 19 9	£841 8 3	£989 10 7
Fees ..	£204 1 0	£274 3 6	£191 18 0

The Laboratory staff at present consists of the Deputy Island Chemist, three Assistants, Clerk and Storekeeper, and three apprentices. Mr. R. N. Smellie, apprentice, left early in the year.

Mr. H. H. Croucher, Agricultural Chemist, arrived in the Island during the year, and Mr. O. W. Harrison, a former apprentice in this Laboratory, has been appointed at work as Assistant to the Agricultural Chemist.

(Sgd.) W. L. BARNETT,
Deputy Island Chemist.

IX. STAFF.

The following new appointments were made in the Department during the year:—

Mr. J. W. Howe, M.Sc., B.S.A., Headmaster and Farm Superintendent.
 Mr. H. H. Croucher, B.Sc., Agricultural Chemist.
 Mr. R. S. Martinez, Superintendent of Agriculture.
 Mr. A. F. Thelwell, Superintendent Grove Place.
 Mr. E. U. Lewis, Superintendent of Stock, Grove Place.
 Mr. H. C. Virtue, Asst. Master Farm School.
 Mr. V. A. Valentine, Junior Assistant Master, Farm School.
 Mr. I. B. Cunningham, Metal Work Instructor, Farm School.
 Mr. C. F. Wickers, Drill Instructor, Farm School.
 Mr. R. M. Rainford, Woodwork Instructor, Farm School.
 Mr. G. McGahan, Lecturer in Surveying and Building Construction, Farm School.
 Mr. R. A. Amiel, Farm Foreman, in place of Mr. N. F. Ottey, resigned.
 Mr. O. W. Harrison, Technical Assistant, Government Laboratory.

Vacation leave was taken by the following officers:—

Dr. S. Lockett, Government Veterinary Surgeon	6 months
Mr. R. S. Martinez, Superintendent of Agriculture	6 months.
Mr. W. L. Barnett, Deputy Island Chemist	2 months.
Mr. N. B. Donaldson, Accountant	10 weeks
Mr. R. A. White, Clerk	6 weeks.
Miss R. E. White, Typist & Stenographer	6 weeks.
Miss E. Marson, Assistant	6 weeks.

H. H. COUSINS,
 Director of Agriculture & Island Chemist.

The Hon. Colonial Secretary,
 Kingston.

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